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**BASELINE ECOLOGY
OF
THE ILLINOIS ROUTE 3 STUDY AREA**

FINAL REPORT

**Assembled by:
Edward Anderson, Researcher II**

**Assisted By:
Cynthia Trout, Researcher I
Todd Fink, Researcher I
Michael Morris, Research Assistant
Eric Ulaszek, Research Assistant**

**Supervisors:
Dr. W. D. Klimstra, Director
Dr. Alan Woolf, Assistant Director**

**Contracted By:
COOPERATIVE WILDLIFE RESEARCH LABORATORY
Southern Illinois University at Carbondale
62901**

**Funded By:
Illinois Department of Transportation
2300 South Dirksen
Springfield, Illinois
62764**

FORWARD

This investigation was begun 1 March 1985 by the Cooperative Wildlife Research Laboratory under a contract with the Illinois Department of Transportation. The resulting report represents a biological survey of the Illinois Route 3 relocation (Gale-Twente Project) in Alexander County. It is a response to the Scope of Work prepared by IDOT and accomodates requirements of the National Environmental Policy Act.

The Cooperative Wildlife Research Laboratory, under the direction of W. D. Klimstra was established in 1951. Dr. Klimstra and Laboratory staff have been engaged in a variety of selected environmental impact analyses during the past 25 years. There has been contribution as a result of requests and contracts by the U.S. Army Corp of Engineers, Consolidation Coal Co., AMAX Coal Co., Illinois Institute for Environmental Quality, Illinois Department of Mines and Minerals, Illinois Department of Conservation, Illinois Abandoned Mined Land Reclamation Council, U.S. Department of Energy, and others. The Laboratory has developed national recognition for its continuing expertise in addressing the impacts of human interests and needs on the air-water-land resource base necessary for the well-being of native fauna and flora.

PROJECT FIELD STAFF

Edward Anderson. Education: B.S. 1976 Agric. Sci. U. of Ill.; M.S. 1983 Zoology (Wildlife Ecol.) S. Ill. Univ. Employment: Ill. Dept. Conserv. Park Maintenance 1976-79; S. Ill. Univ. Coop. Wildl. Res. Lab. 1980-84 Res. Assist. River Otter and Woodrat projects and Researcher II River Otter, Swamp Rabbit and Least Tern projects. Specialty: Vertebrate Ecology.

Cynthia Trout. Education: B.A. 1981 Biol./Chem. Monmouth College; M.S. 1983 Zoology W. Ill. Univ. Employment: W. Ill. Univ. Dept. Biol. 1981-83 Teaching Assist. and Res. Assist. Specialty: Aquatic Ecology.

Michael Morris. Education: A.S. 1975 Life Sci. Parkland College; B.S. 1979 Zoology, M.A. 1981 Zoology, PhD 1986 (expected) Zoology S. Ill. Univ. Employment: Ill. Nat. Hist. Surv. 1975-78 Technical Assist. Ichthyological and Herpetological collections and Acting Curator of Herpetology; S. Ill. Univ. Dept. Zool. 1979-84 Res. Assist., Teaching Assist. and Instructor. Specialty: Ecology and Taxonomy of Fishes and Herptiles.

Todd Fink. Education: A.S. 1979 Gen Biol. Belleville Area College; B.S. 1981 Zoology and M.A. Zool. (Ornithology) 1985, S. Ill. Univ. Employment: S. Ill. Univ. Dept. Zool. 1982-84 Teaching Assist. (Vert. Ecol., Ornith.) Coop. Wildl. Res. Lab. summer 1983 Research Assist. Avifauna of surface mined areas project; Ill. Dept. Conserv. 1980-85 Volunteer Bird Census Taker. Specialty: Ornithology/Ecology.

Eric Ulaszek. Education: A.S. 1978 Horticulture College of DuPage; B.S. 1982 Bot./Plant Sci. S. Ill. Univ.; M.S. 1985 (expected) S. Ill. Univ. Employment: S. Ill. Univ. Dept. Bot. 1982-85 Res. Assist. (Cigutera project) and Teaching Assist. Specialty: Plant Taxonomy/Ecology.

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TABLE OF CONTENTS

	<u>Page</u>
Section 1.0	
INTRODUCTION	1
1.1 Purpose of this Study and Project Location	1
Section 2.0	
MATERIALS AND METHODS	3
2.1 Study Sites	3
2.2 Vegetation Sampling	6
2.3 Terrestrial Wildlife	9
2.3.1 Amphibian and Reptile Sampling	9
2.3.2 Bird Sampling	10
2.3.3 Mammal Sampling	11
2.4 Aquatic Biota	14
2.4.1 Physical Characteristics	14
2.4.2 Water Quality	14
2.4.3 Fish Sampling	15
2.4.4 Mussel Sampling	16
2.4.5 Macroinvertebrate Sampling	17
2.5 Threatened and Endangered Species	19
Section 3.0	
RESULTS AND DISCUSSION	20
3.1 Climate	20
3.2 Geology and Soils	20
3.2.1 Geology	20
3.2.2 Soils	22
3.3 Vegetation	24
3.3.1 Upland Forest Communities	25
3.3.2 Floodplain Forest Communities	34
3.3.3 Successional Field Communities	37
3.3.4 Pastureland	40
3.4 Terrestrial Wildlife	43
3.4.1 Amphibian and Reptile Sampling	43
3.4.2 Bird Sampling	43
3.4.3 Mammal Sampling	44

TABLE OF CONTENTS (continued)

	<u>Page</u>
3.5 Aquatic Biota	48
3.5.1 Hydrology	48
3.5.2 Aquatic Habitats	49
3.5.3 Water Quality	61
3.5.4 Fish Sampling	64
3.5.5 Mussel Sampling	73
3.5.6 Macroinvertebrate Sampling	73
3.6 Threatened and Endangered Species	80
3.6.1 Vegetation	80
3.6.2 Amphibians and Reptiles	80
3.6.3 Birds	80
3.6.4 Mammals	84
3.6.5 Fish	87
3.6.6 Mussels	87
Section 4.0 CONCLUSIONS	88
4.1 Impact Analysis	88
4.1.1 Vegetation	88
4.1.2 Terrestrial Wildlife	89
4.1.3 Aquatic Biota	92
4.2 Recommendations	94
Section 5.0 LITERATURE CITED	96
Section 6.0 APPENDICES	103
A Vegetation Known in the Illinois Route 3 Study Area	
B Composition and Quatitative Descriptions of Major Plant Communities in the Illinois Route 3 Study Area	
C Amphibians and Reptiles Known or Potential in the Illinois Route 3 Study Area and Their Preferred Habitats	
D Birds Known or Potential and Their Residence in the Illinois Route 3 Study Area	
E Results of Driving Surveys for Birds in the Illinois Route 3 Study Area	
F Mammals Known or Potential in the Illinois Route 3 Study Area and Their Preferred Habitats	

TABLE OF CONTENTS (continued)

Section 6.0

APPENDICES (continued)

- G Fish Species Known or Potential in the Illinois Route 3
Study Area
- H Fish Species Collected in Sexton Creek, 1959-1984
- I Fish Species Collected in Miller Creek, 1964-1984
- J Mussels Known or Potential in the Illinois Route 3 Study
Area
- K Aquatic Macroinvertebrates Collected in the Illinois
Route 3 Study Area

TABLES

<u>Table</u>		<u>Page</u>
1	Major plant communities and associated habitats (White and Madany 1978) used to classify and cover map the Illinois Route 3 Study Area.....	7
2	Community types and associated habitats at driving bird census stops within the Illinois Route 3 Study Area.....	12
3	Estimated breeding bird densities (birds per 100 acres) based on walking transect surveys for the Illinois Route 3 Study Area; spring 1984.....	45
4	Relative abundance of small mammals in the Illinois Route 3 Study Area; spring and fall 1984.....	47
5	Descriptions of deepwater and wetland habitats in the Illinois Route 3 Study Area.....	50
6	Physical characteristics of Sexton and Miller creeks in the Illinois Route 3 Study Area, Alexander County, Illinois.....	53
7	Descriptive characteristics of sampling stations established on Sexton Creek, Alexander County, Illinois; 1984.....	54
8	Descriptive characteristics of sampling stations established on Miller Creek, Alexander County, Illinois; 1984.....	55
9	Water quality data for Sexton Creek, Alexander County, Illinois; 1984.....	62
10	Water quality data for Miller Creek, Alexander County, Illinois; 1984.....	63
11	Water quality data for North and South ponds; Alexander County, Illinois; 1984.....	65
12	Total number of fish collected and their relative abundances at stations on Sexton Creek, Alexander County, Illinois; 1984.....	67
13	Total number of fish collected and their relative abundances at stations on Miller Creek, Alexander County, Illinois; 1984.....	69

TABLES (continued)

<u>Table</u>		<u>Page</u>
14	Relative abundance and number of fish collected in North Pond and South Pond, Alexander County, Illinois, 1984.....	72
15	Qualitative macroinvertebrate sample data from Sexton Creek, Alexander County, Illinois; 1984.....	74
16	Qualitative macroinvertebrate sample data from Miller Creek, Alexander County, Illinois; 1984.....	76
17	Qualitative macroinvertebrate sample data from North Pond and South Pond, Alexander County, Illinois; 1984.....	79
18	Threatened and endangered species known or potential in the Illinois Route 3 Study Area.....	81

FIGURES

<u>Figure</u>	<u>Page</u>
1	Illinois Route 3 Study Area Location.....2
2	Illinois Route 3 project sections and transect locations; Alexander Co., Illinois.....4
3	Bird and fish sampling points in the Illinois Route 3 Study Area, Alexander County.....5
4	Soil associations in the Illinois Route 3 Study Area, Alexander Co., Illinois.....23
5	Cover mapping of the Illinois Route 3 Study Area, Alexander Co., Illinois.....26
6	Cover mapping of the Illinois Route 3 Study Area, Alexander Co., Illinois.....27
7	Cover mapping of the Illinois Route 3 Study Area, Alexander Co., Illinois.....28
8	Dry-mesic upland forest habitat along Transect C, Section 2, of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.....32
9	Mesic upland forest habitat along Transect A, Section 1, of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.....33
10	Wet floodplain forest habitat along lower Miller Creek, Section 1, in the Illinois Route 3 Study Area, Alexander County, Illinois; fall 1984.....36
11	Successional field habitat along Transect E, Section 3, of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.....38
12	Successional field habitat along the abandoned railroad bed (proposed relocation route) in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.....39
13	Successional field habitat along the abandoned railroad bed (proposed relocation route) west of North Pond, Section 1, in the Illinois Route 3 Study Area, Alexander County, Illinois; fall 1984.....41

FIGURES (continued)

<u>Figure</u>		<u>Page</u>
14	Pastureland habitat along Transect C, Section 2, of the Illinois Route 3 Study Area, Alexander County, Illinois; fall 1984.....	42
15	Location of aquatic habitats in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois.....	51
16	Sexton Creek and the abandoned I.C.G. Railroad bridge (proposed site for new highway bridge) in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.....	56
17	Miller Creek above Station 4, Section 2, in the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.....	57
18	North Pond in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.....	59
19	Route 3 Pond in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois; fall 1984.....	60

Section 1.0

INTRODUCTION

1.1 PURPOSE OF THIS STUDY AND PROJECT LOCATION

The Illinois Department of Transportation has initiated planning for a proposed reconstruction/relocation of an approximate 7.1-mile (11.5-km) segment of Illinois Route 3 extending from 0.5 mile (0.8 km) north of Gale south to the Thebes Wye then southeast to Twente Crossings, Alexander County, Illinois (Fig. 1). To meet the requirements of the National Environmental Policy Act of 1969 and the Endangered Species Act of 1973, the Cooperative Wildlife Research Laboratory was contracted to conduct a biogeographical and ecological characterization (inventory) of the fauna and flora of the project area in sufficient detail to allow assessment of the impact of the project upon these resources. Survey activities were developed to characterize the ecology of the project area, defined as the region within a mile (1.6-km) wide corridor along the proposed reconstruction/relocation route (Fig. 1).

GENERAL HIGHWAY MAP
ALEXANDER COUNTY
ILLINOIS

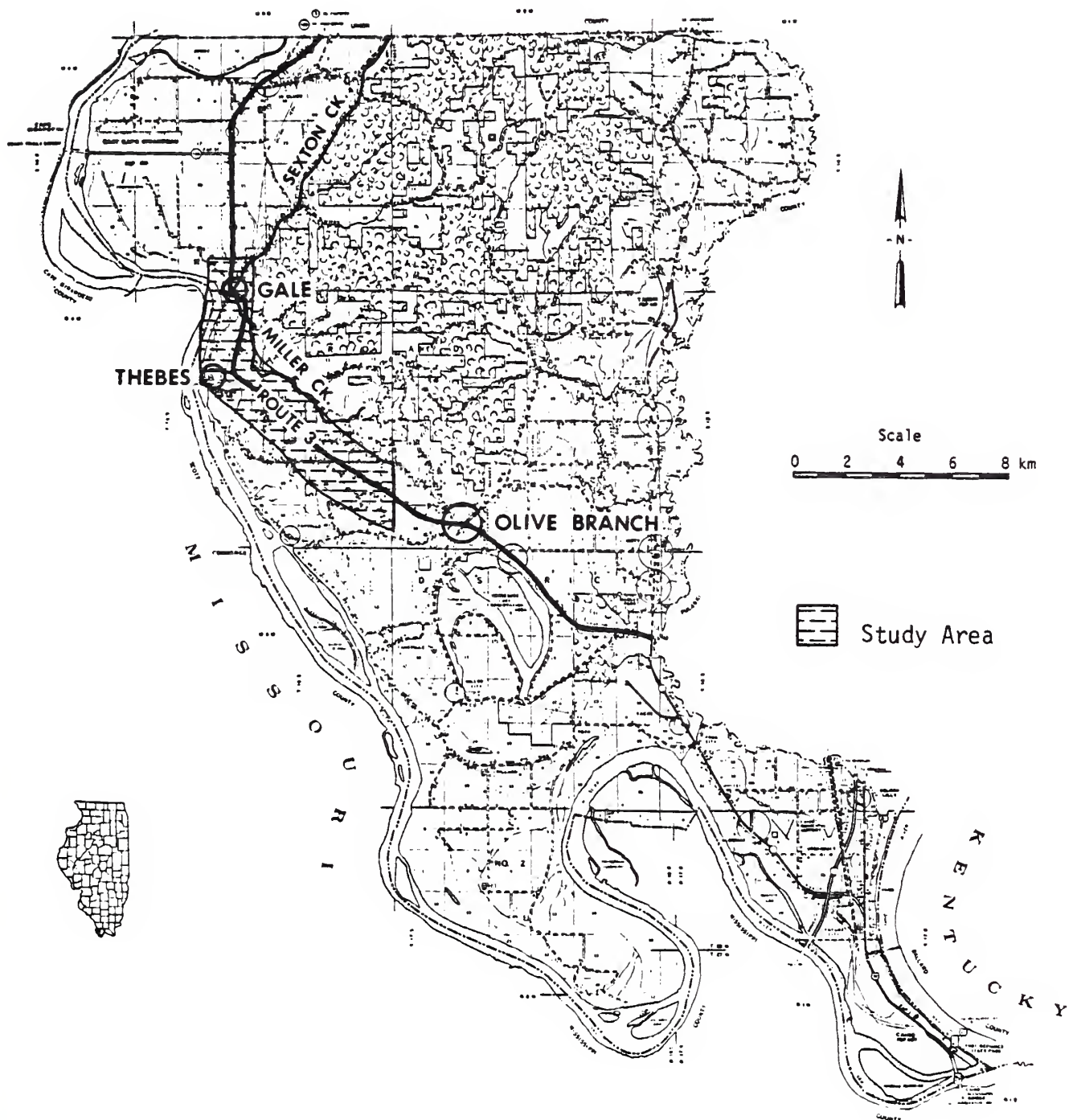


Figure 1. Illinois Route 3 Study Area location.

Section 2.0

MATERIALS AND METHODS

2.1 STUDY SITES

For assessment planning, the project area (Fig. 2) was subjectively divided into 3 sections of approximate equal length, 2.3 miles (3.7 km). At each study section, terrestrial fauna and flora were sampled along 2 transects located about 0.7 mile (1.2 km) apart. Each transect extended 0.5 mile (0.8 km) perpendicularly from the proposed relocation route to the boundary of the study corridor and was marked with flagging tape.

Assessment of aquatic ecosystems within the study area included an intensive examination of 2 streams (Sexton and Miller creeks) and 2 borrow pits. Sampling stations were established along the creeks to include a variety of habitats. At each station, selected physical characteristics of the creek were measured, water quality data recorded, and fish and macroinvertebrates sampled. Fish were also sampled in a small wetland (Route 3 Pond).

Sexton Creek flows through the northern section of the study area (Section 1) and enters the Mississippi River. Three sampling stations (Fig. 3) were established on the lower portion of the creek: Station 1 was located at the mouth, Station 2 was 0.5 mile (0.8 km) upstream at the confluence of Miller Creek, and Station 3 was 1.5 miles (2.4 km) upstream near the Missouri Pacific Railroad bridge. Stations were established to study the creek above, at, and below the proposed relocation of Route 3, which will cross Sexton Creek near Station 2.

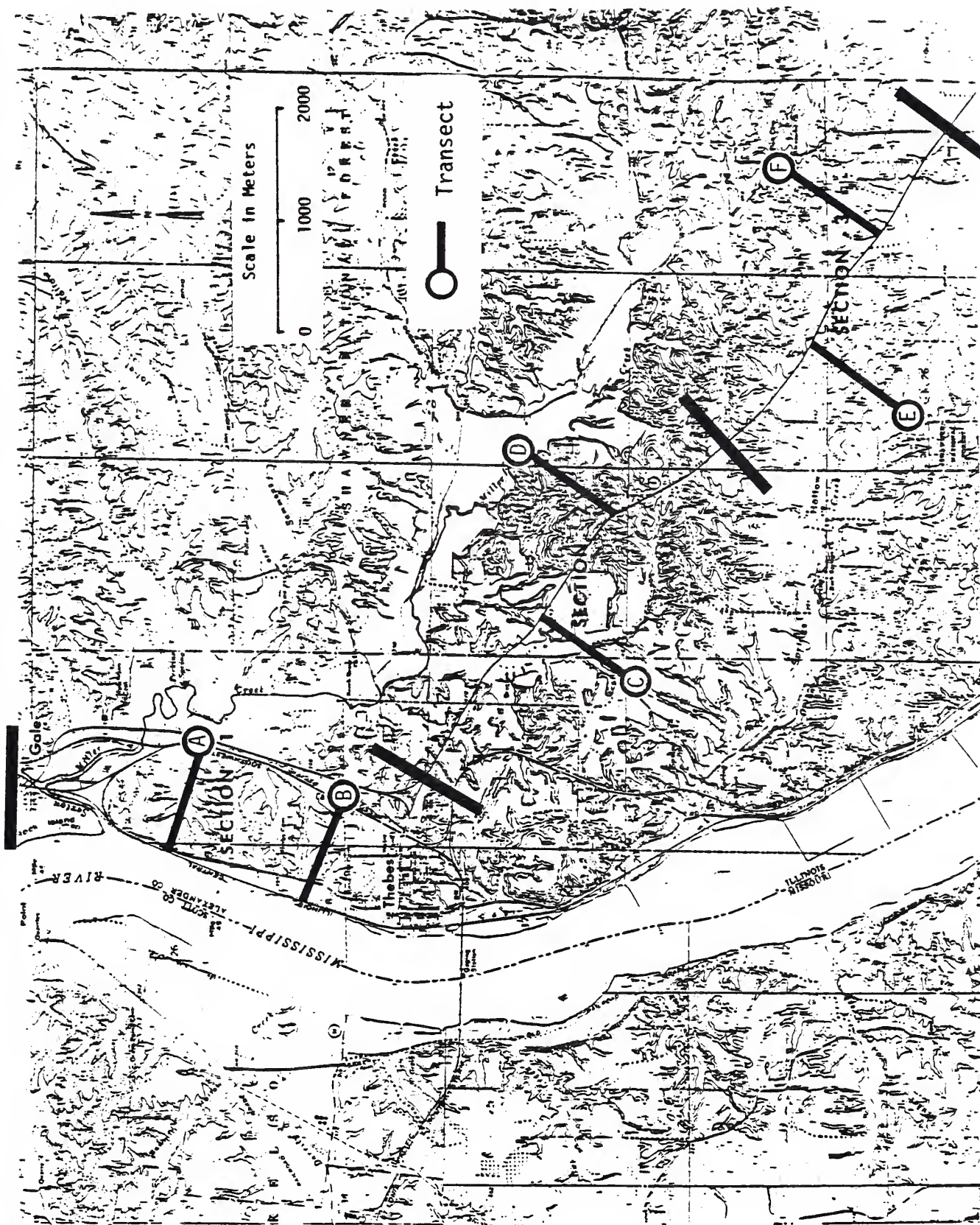


Figure 2. Illinois Route 3 project sections and transect locations; Alexander Co., Illinois.

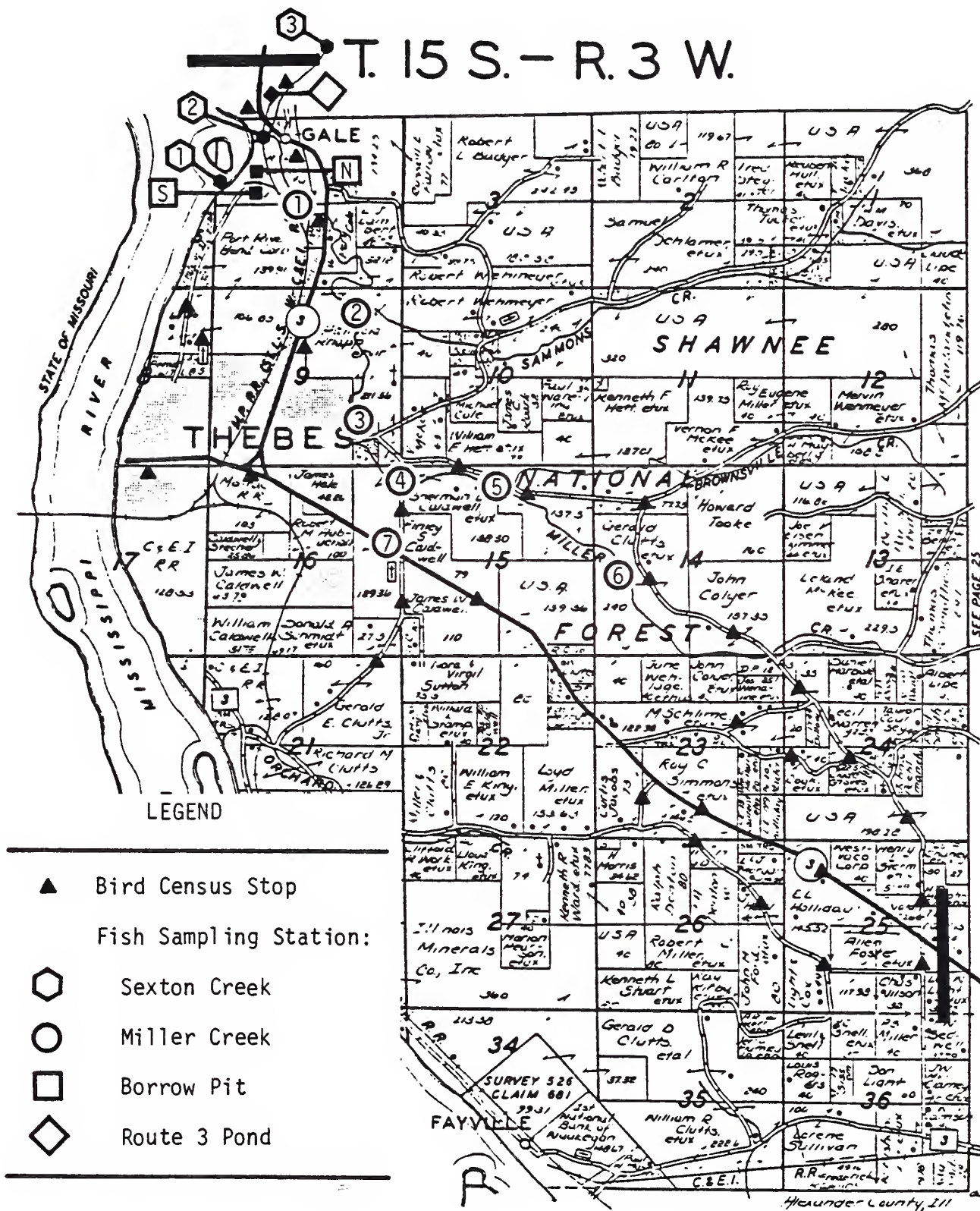


Figure 3. Bird and fish sampling points in the Illinois Route 3 Study Area, Alexander County.

Seven sampling stations were established along Miller Creek which flows almost parallel to Route 3 in the study area (Fig. 3). Six stations were on the main stem, the seventh was on a tributary. Stations were established to sample the creek along its entire length in the study area.

Two borrow pits, North Pond and South Pond, were located in Section 1 of the study area (Fig. 3). North Pond is situated between railroad beds abandoned by the Illinois Central Gulf (I.C.G.) Railroad. South Pond is situated between a railroad bed and a bluff. The proposed relocation route follows the abandoned railroad bed west of North Pond.

Route 3 Pond (Fig. 3) was located in the floodplain north of Gale, and east of Route 3.

2.2 VEGETATION SAMPLING

Vegetation of the study area was mapped using 1983 aerial photography. Major plant communities (Table 1) were identified and classified according to White and Madany (1978). The communities mapped were quantitatively and qualitatively characterized. Preliminary vegetation surveys included reconnoitering the study area and conducting site inspections along the transects to identify major plant communities and note endangered and threatened species flowering or otherwise identifiable at that time. Sampling points for vegetation were established at 250-foot (76.2-m) intervals along each transect yielding 10 sampling points per transect, or a total of 60 sampling points. An additional 35 sampling points were established along the proposed right-of-way and in areas of unique or inadequately sampled vegetation types. The 95 sampling points included

Table 1. Major plant communities and associated habitats (White and Madany 1978) used to classify and cover map the Illinois Route 3 Study Area.

Community Type	Code	Habitat
FOREST		
Upland Forest	1	Xeric Upland Forest
		Dry Upland Forest
		Dry-mesic Upland Forest
		Mesic Upland Forest
Floodplain Forest	2	Wet-mesic Floodplain Forest
		Wet Floodplain Forest
LAKE AND POND		
	3	Pond
STREAM		
	4a	Creek
	4b	River
CULTURAL		
	5a	Cropland
	5b	Pastureland
	5c	Successional Field
	5d	Developed Land
	5e	Artificial Pond

upland forest communities (54), floodplain forest communities (10), successional field communities (21), and pastureland (10).

Three strata of vegetation were sampled at each point: herbaceous vegetation, saplings, and trees. Herbaceous vegetation and seedlings were recorded for a 43-square foot (4-m^2) area around each sampling point. Absolute vegetation cover was recorded. Saplings, shrubs, understory trees, and subdominant trees less than 9 inches (23 cm) diameter-breast-height (DBH) in a 430-square foot (40-m^2) area around each sampling point were tallied and identified. Trees greater than 9 inches (23 cm) DBH were identified and recorded for a 4300-square foot (400-m^2) area surrounding each point.

Density, frequency, and basal area of a species were defined as follows (Mueller-Dombois and Ellenberg 1974):

Density = number of individuals of a species

Frequency = number of times a species is recorded at a given number of sample points

Basal area = area outline of a tree measured at breast height, 4.9 feet (1.5 m) above the ground

Relative density, relative frequency, relative dominance, and importance value of species were determined using the following formulas (Mueller-Dombois and Ellenberg 1974):

Relative density = $\frac{\text{number of individuals of a species}}{\text{total number of individuals}} \times 100$

Relative frequency = $\frac{\text{frequency of a species}}{\text{sum frequency of all species}} \times 100$

Relative dominance = $\frac{\text{basal area of a species}}{\text{total basal number of all species}} \times 100$

Importance value = relative density + relative frequency + relative dominance

2.3 TERRESTRIAL WILDLIFE

2.3.1 Amphibian and Reptile Sampling

Amphibian and reptile surveys were performed throughout the study period by: general search of habitats on foot, raking through leaf litter and turning ground cover that might shelter animals; viewing possible basking sites in aquatic habitats through binoculars for sunning snakes and turtles; dipnetting and seining aquatic habitats for amphibian larvae and aquatic species; and listening for frog vocalizations. Roads in the project area were driven to record amphibians and reptiles crossing; road-killed animals were examined and identified. Species and location of amphibians and reptiles observed while traversing various habitats during other surveys also were recorded.

Drift fences with funnel traps were established in 2 areas in October and removed in December. Each fence consisted of a 49-foot (15-m) length of 12-inch (30-cm) high aluminum screening. The screening was buried to a depth of a few inches (centimeters), to discourage burrowing, and supported by stakes. Funnel traps, also made of aluminum screening and measuring 16 inches (40 cm) long X 8 inches (20 cm) in diameter, were placed at each end of the fences and on both sides of the fences at the center. Fences were placed along the common boundary of two different habitats to maximize chances of trapping species using either habitat or crossing from one habitat to the other.

The combination of drift fences with the other collecting methods has proven more effective than any single method for sampling the herpetofauna of an area (Campbell and Christman 1982). Field surveys were augmented by canvassing herpetological collections of the Illinois Natural History

Survey, Champaign, IL; the Department of Zoology, Southern Illinois University at Carbondale; and the Field Museum of Natural History, Chicago, IL for records from the study area.

2.3.2 Bird Sampling

During the surveys, birds were observed daily in various habitats within the project area. Habitats utilized and relative abundance of major species were determined. In addition to general observation, 2 methods were used to determine density and abundance:

(1) Driving bird censuses were conducted from May-December by cruising local roads and stopping at 0.5-mile (0.8-km) intervals for approximately 5 minutes to record birds seen or heard. The 31 census stops (Fig. 3) were chosen to include representative habitats. Data were analyzed in terms of relative abundance and relative frequency of occurrence (Linsdale 1928, Terpening et al. 1973). Relative abundance of a species (RA) was calculated using the following formula:

$$RA_x = \frac{N_x}{N} \times 100$$

where N_x is the number of individuals of species X observed, and N is the total number of individuals of all species. Relative frequency of occurrence of a species (RF) is the percent probability of observing a given species per visit to the project area and was calculated using the following formula:

$$RF_x = \frac{N_x}{V} \times 100$$

where N_x is the number of individuals of species X observed, and V is the total number of visits (driving censuses). Habitat preferences were noted

and included those habitats in which each species was most abundant, or most frequently encountered. Habitats were coded by number following Table 2; more than a single habitat type occurred in the vicinity of each census stop.

(2) During June, quantitative estimates of breeding density were obtained using a modified strip census method (Graber and Graber 1963). All birds seen and heard in a semi-circle of 200-foot (61-m) radius to the front and sides of the observer were recorded (species, number of individuals, and habitat). Binoculars were used in all surveys; however, song and/or call cues provided most identifications in wooded habitats. Strip-census data were used to generate estimates of bird density and species diversity in each habitat type. In addition, efforts were made to locate rare and secretive species.

2.3.3 Mammal Sampling

Mammals in the project area were identified by direct observation; examination of road-killed specimens; detection of tracks, scats, or nests; and/or capture. In spring (May-June) and fall (October-November), relative densities of small mammals were determined using Sherman live traps and pitfall traps. Sherman traps were baited with rolled oats and peanut butter and placed at 66-foot (20-m) intervals along the transects. Trapping was intensified where sign of or habitat for unique species was observed. Additional trapping was done along the proposed right-of-way in Section 1 (Fig. 2). Pitfall traps, set between drift fences (1.6 feet (0.5 m) long, 0.7 foot (0.2 m) high), were placed at 876-foot (267-m) intervals for shrews. Trap lines were run for a minimum of 3 consecutive nights and checked once each day. All catches were identified (species, date,

Table 2. Community types and associated habitats at driving bird census stops within the Illinois Route 3 Study Area.

Community Type	Code	Habitat	Census Stops
FOREST	1p	Upland Forest -	19, 20, 26, 27, 29,
		Pastured	31
	1u	Upland Forest -	5, 7, 9, 12, 13,
		Unpastured	15, 17, 18, 21, 22,
			23, 26, 27, 28, 29, 30, 31
	2	Floodplain Forest	1, 2, 3, 4, 7
LAKE AND POND	3	Pond	2
STREAM	4a	Creek	2, 3, 4, 7, 12, 13, 14, 16, 17, 18, 25, 30
	4b	River	6, 7
CULTURAL	5a	Cropland	1, 7, 8, 12, 13, 14, 15, 17, 21, 24, 25, 28, 29, 30
	5b	Pastureland	8, 10, 11, 16, 17, 18, 19, 20, 24, 28, 29, 31
	5c	Successional Field	19, 21
	5d	Developed Land	6, 8, 9, 10, 18, 24
	5e	Artificial Pond	10, 11, 16

habitat, location); live animals were toe-clipped for identification of recaptures and released.

In early July and August, mist netting for bats was conducted according to Cope et al. (1978). A wall of mist nets 30 or 60 feet (9.1 or 18.2 m) long was stretched across each trap site between 2 fiber glass poles. The nets were raised with ropes and pulleys to the tree canopy and lowered to remove captures. To facilitate capture, the nets were usually strung at sites with relatively closed canopies. Sampling occurred at 1 site per night between 2000 hours and 2400 hours. Initial trap sites (Sites 1 and 2) were selected over land due to high water levels along Miller Creek. Site 1 (sampled July 2) was located on an abandoned roadbed between areas of inundated floodplain forest 0.1 mile (0.2 km) up Miller Creek. Site 2 (sampled July 3), also located on the abandoned roadbed, was 650 feet (200 m) southwest of South Pond. Site 3 (sampled August 7) was located 0.1 mile (0.2 km) up Miller Creek. Site 4 (sampled August 9) was situated in the southwest tip of South Pond.

Riparian habitat along lower Miller and Sexton creeks (from Route 3 to the Mississippi River) was characterized by on-site inspections. Dominant tree species adjacent to the creek were noted and the riparian vegetation visually classified into 1 of 4 categories as specified by Brack (1979):

1. Category I - Few trees on either bank.
2. Category II - Scattered small trees (less than 16 inches (40 cm) DBH) on either bank.
3. Category III - Mature trees (greater than 16 inches (40 cm) DBH) on both banks but not extending past edge of the creek.
4. Category IV - Mature trees (greater than 16 inches (40 cm) DBH) more than 10 feet (3 m) overhanging the creek banks on one or both sides.

2.4 AQUATIC BIOTA

2.4.1 Physical Characteristics

At low flow (September-October), depths and velocity were measured in the creeks. Velocity was directly read using a Model 2100 Standard digital current meter (Swoffer Instruments, Inc.). On the borrow pits, Sexton Creek, and Miller Creek Station 1, depths were measured using an Eagle Mach 1 sonar graph recorder (Eagle Electronics). At Miller Creek Stations 2-7, depths were measured by hand. Depths were determined at 1.6-foot (0.5-m) intervals across the width of the stream at various sites within the sampling station. Mean depth (Z) was determined at each site using the following calculation:

$$Z = \frac{\sum Z_n}{R + 1}$$

where Z_n is the depth at a constant interval across the stream, and R is the number of readings taken across the width of the stream. Elevation at each sampling station was estimated from United States Geological Survey 7.6-minute topographic maps.

2.4.2 Water Quality

Water quality data were collected at all sampling sites on Sexton Creek, Miller Creek, North Pond, and South Pond prior to fish and macroinvertebrate sampling. Parameters measured were dissolved oxygen, pH, water temperature, and specific conductance. Secchi disk readings were taken in the ponds. Water temperature and dissolved oxygen were measured using a YSI Model 51A oxygen meter. A Lab-line Lectro MHO-Meter was used to measure specific conductance. A Corning Scientific Instrument Model 610A portable pH meter was used to measure pH.

2.4.3 Fish Sampling

Relative abundance (RA) of a fish species was calculated using the following formula:

$$RA_x = \frac{N_x}{N} \times 100$$

where N_x is the number of samples in which species X was collected, and N is the total number of samples collected. Abundance classes were assigned as follows: A - abundant (81-100% of the samples), C - common (51-80% of the samples), U - uncommon (20-50% of the samples), and R - rare (0-19% of the samples).

Sexton Creek

Fish were sampled in Sexton Creek on 30 May, 24 July, and 4 October. On 30 May, study sites were electroshocked (210 volts, AC) for approximately 30 minutes (15 minutes along each side). On subsequent sampling dates, electroshocking time was decreased because: (1) there was less area to cover due to lower water levels and (2) the sample was qualitative so it was important to collect as many different species as possible and not all fish electroshocked. Electroshocking was completed when the same distance was covered as in the first sample. Fish were counted, identified to species, and returned to the creek.

Miller Creek

Miller Creek Station 1 was electroshocked (210 volts, AC) for 30 minutes on 31 May and for 15 minutes on 24 July. No sample was taken in October as the station was inaccessible by boat. Station 2 was electroshocked for 15 minutes on 24 July; a straight minnow seine (10 feet (3 m) long, 0.2-inch (6-mm) mesh) was used to sample fish on 15 August.

Stations 3-7 were sampled with the straight minnow seine in the spring, summer, and fall. Fish collected by all methods were counted, identified to species where possible, and returned to the creek. A representative of each fish not identified in the field was placed in formaldehyde and brought to the laboratory for identification.

Borrow Pits

North Pond and South Pond were sampled during spring (30 May), summer (24 July), and fall (4 October). The perimeter of each was electroshocked (210 volts, AC) for 15-30 minutes. A straight minnow seine (25 feet (7.6 m) long, 0.2-inch (6-mm) mesh) was pulled in a shallow area of each pond. Fish were counted, identified to species, and returned to the water.

Route 3 Pond

Route 3 Pond was sampled once for fish; the perimeter of open water was electroshocked for 15 minutes on 4 October. Fish were counted, identified to species, and returned to the water.

2.4.4 Mussel Sampling

The banks of Miller and Sexton creeks were walked to note evidence of mussels. Dead specimens were collected and brought to the laboratory for identification. On 3 October, an attempt was made to collect live specimens using a 5-foot (1.5-m) long crowfoot bar. The bar was pulled in water ranging from 2-8 feet (0.6-2.4 m) deep. At Sexton Creek Station 1, the bar was pulled for a distance of 400 feet (122 m); at Station 2, it was pulled from 100 feet (30 m) above the Route 3 bridge to the abandoned I.C.G. Railroad bridge. Because no specimens were collected at established sampling stations, an attempt was made to collect specimens at other

prospective sites. The bar was pulled along the side channel northeast of Rock Island, the small island north of Station 1, for approximately 50 feet (15 m) in water 1-5 feet (0.3-1.5 m) deep.

2.4.5 Macroinvertebrate Sampling

A qualitative macroinvertebrate sampling was incorporated into the study to aid in determination of the existing quality of the aquatic environment. Macroinvertebrates are dependent upon minimum water quality, usually occurring at low flow and high temperature, which has occurred for weeks and months prior to sampling (Weber 1973). Proportion of intolerant to tolerant indicator organisms within the macroinvertebrate community along with water chemistry will reflect the water quality of the area.

Macroinvertebrates were collected 27 July or 14, 15, or 23 August from stations established for fish sampling. Sexton Creek and the borrow pits were sampled with an Ekman Grab. Three grabs were taken from each station and samples field processed. Grab contents were placed in a 3-gallon (3.6-litre) Wildco washbucket (No. 30 mesh) to facilitate removal of finer materials. Aquatic invertebrates and debris retained in the washbucket were placed in an appropriately labeled container with 70% ETOH and brought to the laboratory for identification and enumeration.

Stations on Miller Creek were sampled 27 July or 14 or 15 August for a period of 1 hour. Initial effort involved collection of organisms from bottom, shore, overhanging vegetation, and floating debris using a long-handled dipnet and forceps for 15 minutes in each habitat. Specimens taken from each habitat were placed in a jar containing 70% ETOH. A secondary effort was made to collect organisms missed in the initial effort. Intensive sampling was done in unique areas within the sampling

station to emphasize rare taxa. Samples were brought to the laboratory for identification and enumeration.

Samples were processed in the laboratory by handpicking to remove invertebrates from the debris. A stereoscopic dissection microscope and taxonomic keys were used to identify organisms to a taxonomic level necessary to associate organisms with a tolerance status established by the Illinois Environmental Protection Agency (IEPA) or current scientific literature. The 4 tolerance status categories for aquatic macroinvertebrates found in Illinois waters were defined by IEPA as follows:

(1) Intolerant: Organisms whose life style is dependent upon a narrow range of environmental conditions. Rarely found in areas of organic enrichment; replaced by more tolerant species upon degradation of their environment. Because evaluations are based on the presence or absence of intolerant organisms, a single specimen has as much weight as a large population (Weber 1973).

(2) Moderate: Organisms which lack the extreme sensitivity to environmental stress displayed by intolerant species but cannot adapt to severe environmental degradation. Organisms normally increase in abundance with slight to moderate levels of organic enrichment.

(3) Facultative: Organisms which display the ability to survive over a wide range of environmental conditions and possess a greater degree of tolerance to adverse conditions than either intolerant or moderate species. Includes all organisms which depend upon surface air for respiration.

(4) Tolerant: Organisms which not only have the ability to survive over a wide range of environmental extremes but are generally capable of thriving in water of extremely poor quality and even anaerobic conditions.

Often found in great abundance in areas of organic pollution. Since these organisms may be found in both clean and degraded habitats, their presence or absence is not significant.

Each sampling station was assigned a classification based upon abundance of intolerant organisms present. The following classification was used to evaluate stream environments (IEPA).

Balanced environment (BE): Intolerant organisms are many in number and species, or more in numbers than other forms present. Intolerant present $\geq 50\%$; Moderate, facultative, and tolerant usually present $\leq 50\%$.

Unbalanced environment (UB): Intolerant organisms are less in number than other forms combined; but combined with moderate forms, they usually outnumber the tolerant forms. Intolerant present $< 50\%$, but $> 10\%$; moderate, facultative, and tolerant usually present $> 50\%$.

Semi-polluted environment (SP): Intolerant organisms are few or may not be present. Moderate and/or facultative organisms present. Intolerant present $< 10\%$. Moderate, facultative, and tolerant present $> 90\%$.

Polluted environment (PE): Intolerant organisms absent, only tolerant organisms present or no organisms present. Tolerant present = 100%.

2.5 Threatened and Endangered Species

A review of literature was conducted to identify threatened and endangered plants and animals (federal and state) of potential and known occurrence on the project area; habitat requirements were also noted. Emphasis was placed on determining whether potentially occurring species, or appropriate habitat for them, exists in the project area. Location and habitat of species encountered during surveys were recorded.

Section 3.0

RESULTS AND DISCUSSION

3.1 CLIMATE

Alexander County has a temperate climate with frequent changes in temperature, humidity, cloudiness, and wind direction during much of the year. A wide annual temperature range of about 100 degrees F (38 degrees C) is common. Winters are relatively mild and January normally is the coldest month with a mean temperature of 37.6 F (3.1 C). July normally is the warmest month with a mean temperature of 81.0 F (27.2 C). Average annual temperature is 60.1 F (15.6 C).

Annual precipitation averages slightly more than 45 inches (114 cm), with a range of approximately 30 to 70 inches (76 to 178 cm). Precipitation is fairly uniformly distributed throughout the year. The wettest single months are January and March, and July is the driest. Precipitation in summer generally occurs as showers or brief thunderstorms. A single thunderstorm often produces more than an inch (2.5 cm) of rain; more than 7.5 inches (19 cm) of rain has fallen within a 24-hour period. Average annual snowfall is about 9 inches (23 cm), and a third of the winters have less than 5 inches (13 cm).

3.2 GEOLOGY AND SOILS

3.2.1 Geology

The geomorphology of southern Illinois is dominated by the fact that glaciers did not cover this portion of the state. However, glaciers still

had effects on the geology and soils of the region. Alexander County lies in this driftless area and contains 3 physiographic divisions (Leighton et al. 1948, Harris et al. 1977). Most of the northern part of the county, including the entire study area, lies in the Salem Section of the Ozark Plateaus Province. This is the most rugged topographic area in the county and has high relief and very steep slopes. The uplands are composed of chert and limestone, overlain by thick deposits of loess except on steep slopes where erosion has exposed the underlying rock. A small part of northeastern Alexander County lies in the Interior Low Plateaus Province of the rugged Shawnee Hills Section. The southern half of the county lies in the Coastal Plain Province characterized by more gentle topography of plains and hills.

A classification of natural geographic divisions of Illinois has been devised based on topography, glacial history, bedrock, soils, and the distribution of native flora and fauna (Schwegman 1973). This classification emphasizes the drastic contrast in topography evident in the study area and indicates the area lies at the boundary of 2 distinct natural divisions roughly divided by Sexton Creek. The area north of Sexton Creek lies in the southern section of the Lower Mississippi River Bottomlands Division which consists of the Mississippi River and its floodplain (broad flat river bottomlands) from Alton to the Thebes Gorge. The largest part of the study area lies south of Sexton Creek and is in the southern section of the Ozark Division which includes the Illinois part of the Salem Plateau of the Ozark uplift. The division is mostly rugged, forested hills and contains many Ozarkian, southern, and southwestern plants and animals that are rare or absent elsewhere in Illinois (Schwegman 1973).

3.2.2 Soils

The existing soils of Alexander County have been surveyed and described (Parks and Fehrenbacher 1968); soil descriptions in this section are based on that survey. Soils of the Route 3 study area formed mostly in alluvium or lakebed sediments, which are deposited by water, and in loess, which is deposited by wind. Soils on bottomlands developed mainly in old and recent alluvium that ranged from sand or loamy sand to silty clay or clay. Soils on uplands formed mainly in loess, or windblown silt. Climate and the natural vegetation of the area also influenced soil development. The humid temperate climate of Alexander County is conducive to the growth of deciduous forest; as a result, most soils have a relatively light colored surface horizon. The study area contains 5 major soil associations which have been mapped in Fig. 4.

The Darwin-Alluvial Land-Riley soil association occurs in bottomlands at the northern edge of the study area. These somewhat poorly drained soils formed in slack-water and lacustrine sediments from the Mississippi River and are underlain in many places by sandy strata. The soils generally are highly productive with corn and soybeans the principal crops. Though protected from overflow by levees, flooding and wetness are the main problems in developing these soils for cultivation.

Karnak-Darwin soils occupy low areas in the bottomlands and along Sexton Creek at the northern edge of the study area. These silty clay soils are fertile but generally are poorly drained and are slightly to medium acidic. Because of wetness and poor tilth, most of these soils are wooded.

The Belknap-Bonnie-Haymond soil association is confined to bottomlands bordering Miller Creek. These silt loam soils range from poorly drained to well drained and are slightly acidic; most are used for crops. The lower border of Sexton and Miller creeks consist of Alluvial Land. These soils are ponded, are frequently flooded, or have a high water table for more than 6 months during the year. As a result, these areas are wooded and provide natural wetland habitat.

Alford-Stookey-Muren soils cover the sloping ridgetops and steep side slopes near Thebes and at the southeastern end of the study area. Alford silt loam soils occupy the ridgetops and are used about equally for cultivated crops and for pasture. Stookey silt loam occurs on the very steep side slopes and almost all is forested. Erosion is the major hazard where these soils are used for crops.

The Stookey-Bodine association covers the uplands in the central portion of the study area. Slopes are steep or very steep and few ridges are wide enough to be used for crops. The soils generally are silt loams and overlie beds of chert. Most of the association is wooded.

3.3 VEGETATION

As previously noted, the Illinois Route 3 Study Area lies in two of the Natural Divisions of Illinois, as defined by Schwegman (1973). The upland areas are in the southern section of the Ozark Division, and the floodplain is in the southern section of the Lower Mississippi River Bottomlands Division. The 2 divisions have markedly different native vegetation, due to soils, topography, drainage, and history of disturbance.

A total of 534 species of vascular plants were identified in the study area between mid-May and late-September (Appendix A).

Six types of native forest communities occur on the study area (Table 1), as defined by White and Madany (1978). Four of these are upland forest communities: xeric upland forest, dry upland forest, dry-mesic upland forest, and mesic upland forest. The remaining two are floodplain forest communities: wet floodplain forest and wet-mesic floodplain forest. Other terrestrial plant communities present include successional areas (including old fields, abandoned pastures, and abandoned rights-of-way) and pastures. Cover mapping of the study area is presented in Figs 5, 6, and 7.

3.3.1 Upland Forest Communities

Upland forest communities occur in the Ozark Division section of the study site. Originally, most of this area was in forest; all of the more level sites have been converted to pasture or cropland. Remaining forests are in ravines, or on slopes and ridges. The dominant tree is white oak (Quercus alba) with an importance value (IV) of 60.2 (Appendix B). Other important species of the tree stratum are black oak (Quercus velutina), pignut hickory (Carya glabra), and American beech (Fagus grandifolia), with IV's of 38.6, 30.6, and 24.1, respectively (Appendix B). Pawpaw (Asimina triloba), IV 20.3, was the dominant species in the sapling stratum. Herbaceous cover averaged 36.3%.

The soils are deep and well drained, derived mostly from loess, with some contributed by bedrock. Only small exposures of the cherty bedrock occur, and these lack the distinctive communities found on the more extensive exposures in the Ozark Division, such as limestone glades.

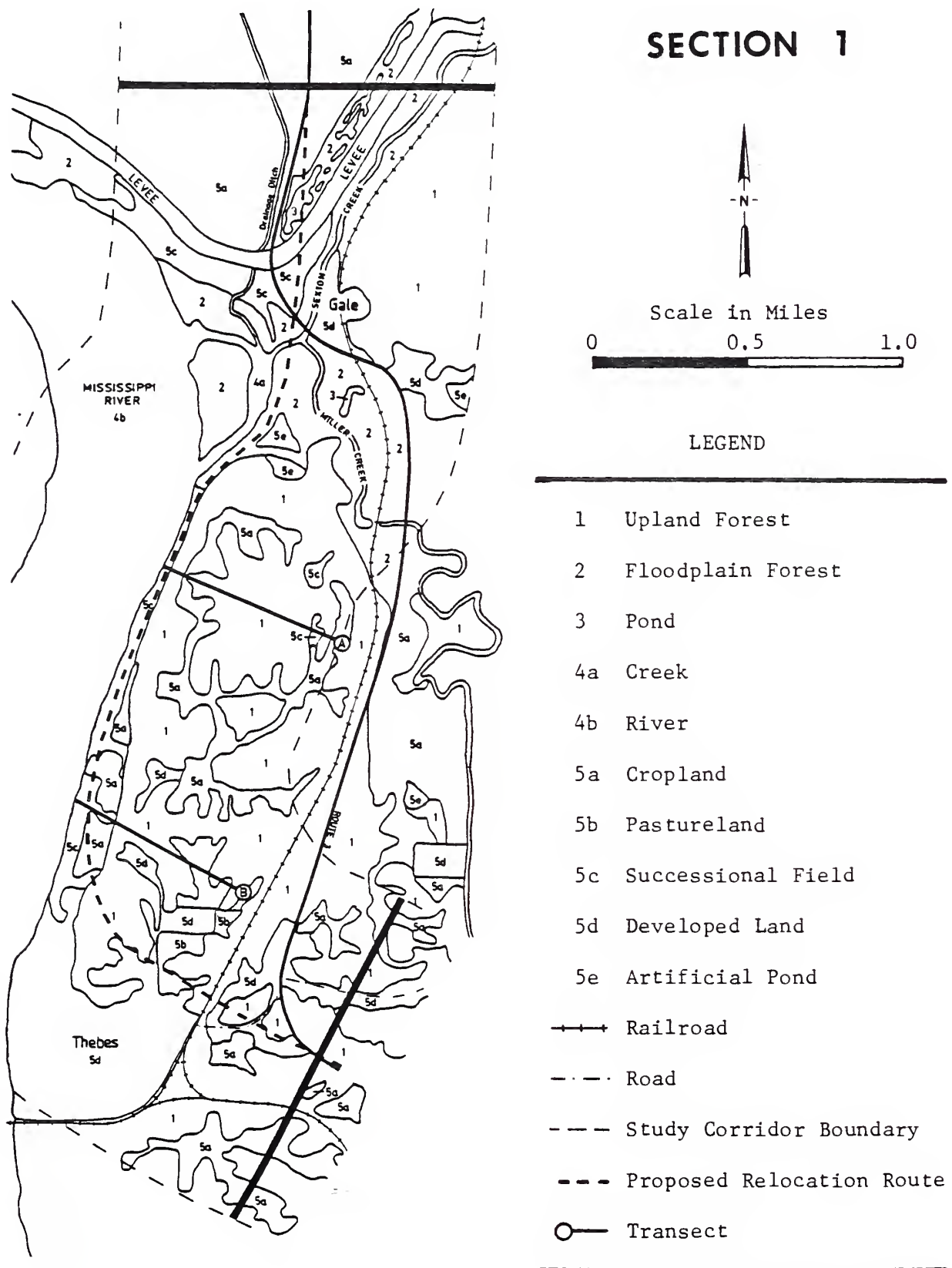


Figure 5. Cover mapping of the Illinois Route 3 Study Area, Alexander Co., Illinois.

SECTION 2

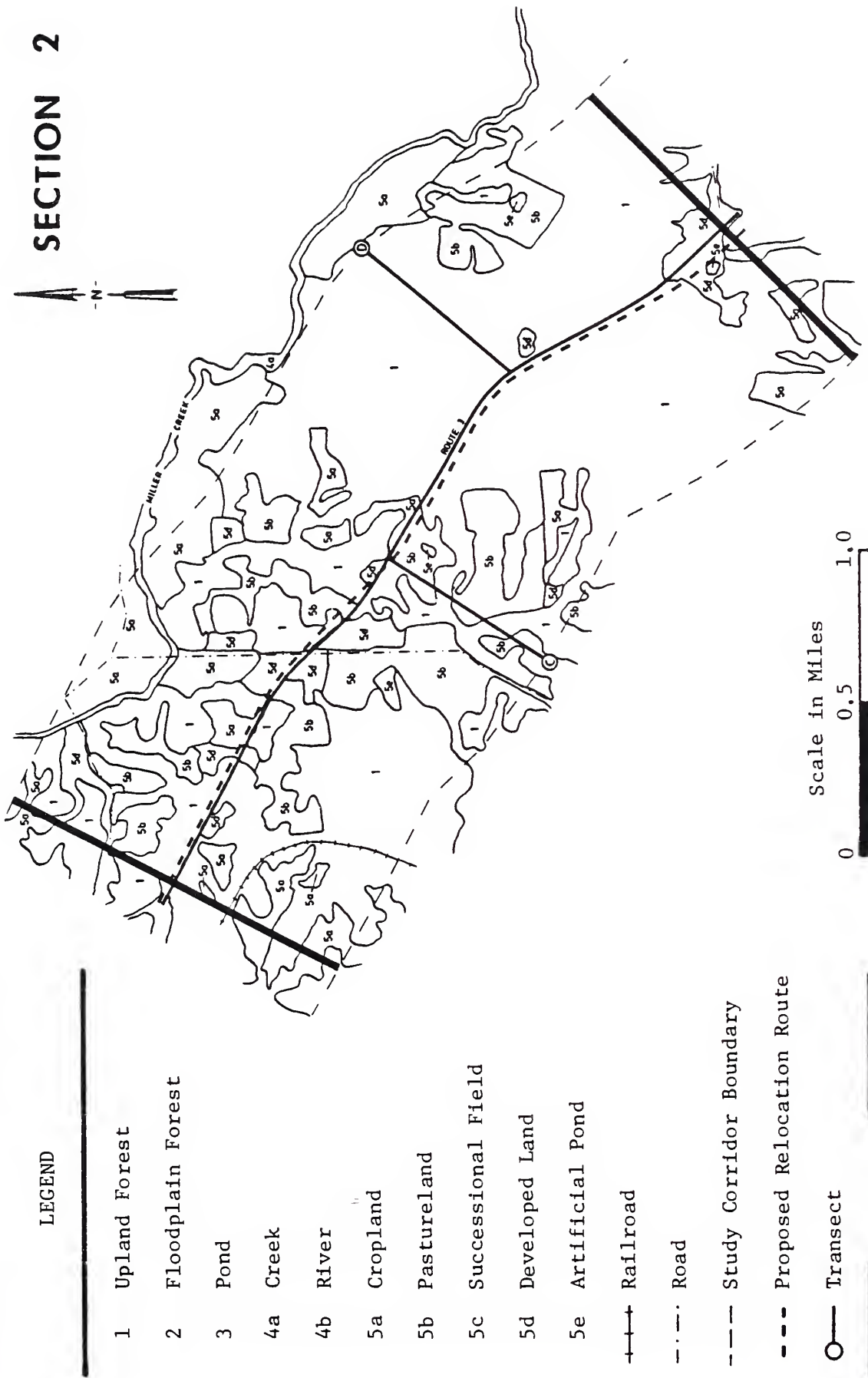


Figure 6. Cover mapping of the Illinois Route 3 Study Area, Alexander Co., Illinois.

LEGEND

SECTION 3

- 1 Upland Forest
- 2 Floodplain Forest
- 3 Pond
- 4a Creek
- 4b River
- 5a Cropland
- 5b Pastureland
- 5c Successional Field
- 5d Developed Land
- 5e Artificial Pond

+ + + Railroad

- . - . Road

- - - Study Corridor Boundary

- - - Proposed Relocation Route

○ Transect

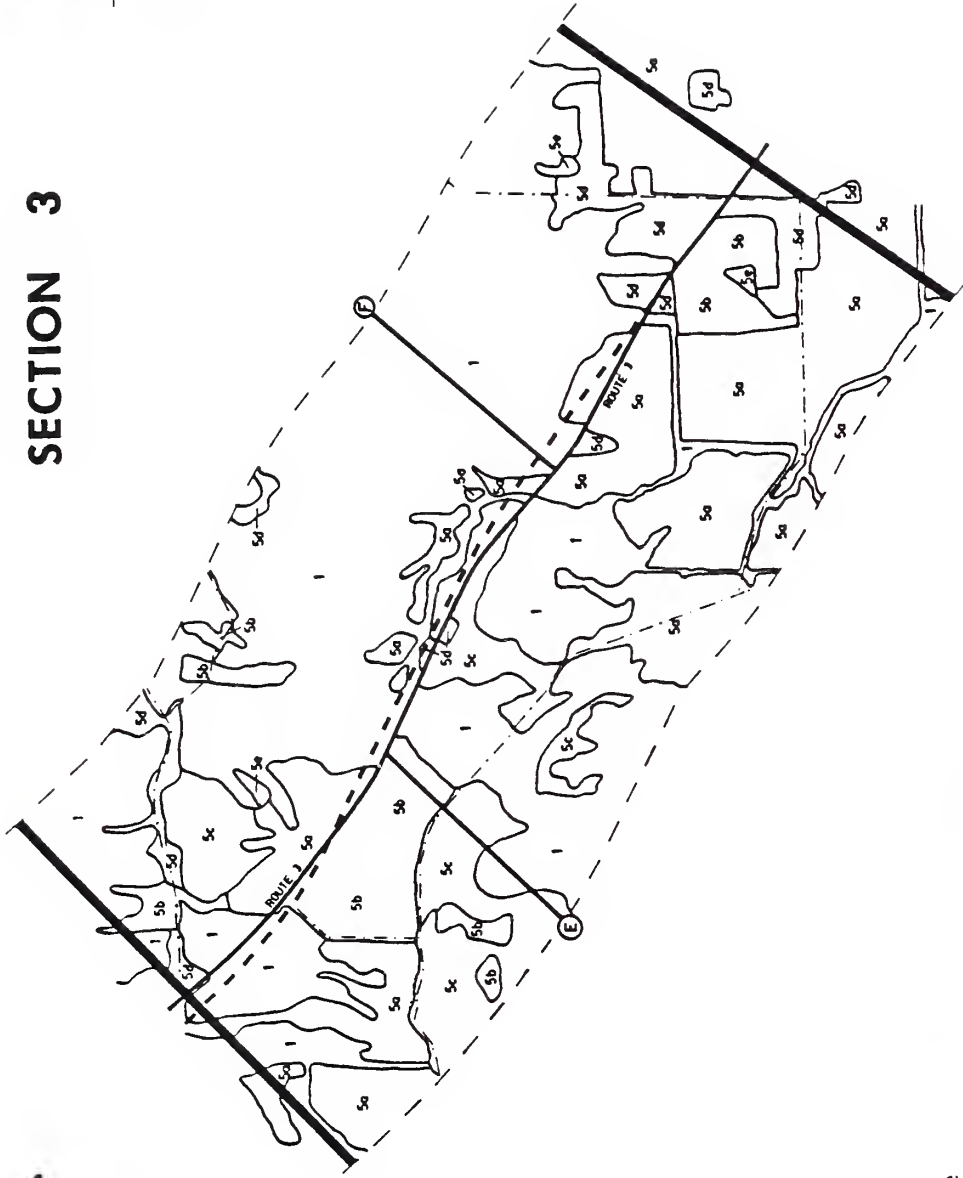


Figure 7. Cover mapping of the Illinois Route 3 Study Area, Alexander Co., Illinois.

All of the forests have been logged, either selectively (high grading) or by clear-cutting. No large old growth trees were observed, and other signs such as stumps, logging roads, and sprout trees were noted throughout the study area. Active logging continues on the study area.

Grazing has occurred in many of the woods, especially along transects C and E (Figs. 6, 7). Besides the presence of cattle in the woods, other such evidence as lack of herbaceous cover, and an open understory were present in grazed woods. Common weedy invaders in grazed woods include black nightshade (Solanum americanum), pokeweed (Phytolacca americana), and raspberries (Rubus spp.). Large scattered individuals of understory trees, such as pawpaw and flowering dogwood (Cornus florida), were present, but there appeared to be little regeneration by seeds or root sprouts.

Surface fires probably played an important role in the past. Aside from the burning of crop stubble, most fires are suppressed, although a small area (approximately 5 acres (2 ha)) of upland dry and dry-mesic forest along Transect F had burned previous to the study. On this site, many woody seedlings and saplings were top-killed, especially hop hornbeam (Ostrya virginiana), sugar maple (Acer saccharum), American beech, and flowering dogwood. Trees over 1 inch (2.5 cm) DBH were not harmed or only slightly scarred. Woody ground cover, mostly poison ivy (Toxicodendron radicans) was killed, and many herbs, present only as rosettes elsewhere, were blooming, including bergamot (Monarda bradburiana), bare-stemmed tick-trefoil (Desmodium nudiflorum), and false sunflower (Helianthus helianthoides).

Fires probably maintained natural openings on the dry ridges. These areas may have been barrens or hill prairies. At least 2 of these former openings were located, now occupied by thick stands of invading woody

species such as smooth sumac (Rhus glabra), sassafras (Sassafras albidum), and rough-leaved dogwood (Cornus drummondii). Usually a few black hickory (Carya texana) could be found at the edges of these sites, and a few prairie plants persisted, including big bluestem (Andropogon gerardi), Indian-grass (Sorghastrum nutans), and rosinweed (Silphium integrifolium).

Xeric Upland Forest

Xeric upland forest occur at few locations on National Forest property, usually on steep south-facing slopes having a thin soil. Post oak (Quercus stellata) dominates the open canopy. Other trees present include pignut hickory, scarlet oak (Quercus coccinea), and black oak. The understory consists mostly of farkleberry (Vaccinium arboreum). Ground cover is usually mosses with poverty oat grass (Danthonia spicata), hawkweed (Hieracium gronovii), and creeping bush clover (Lespedeza repens).

Dry Upland Forest

Dry upland forest occurs on ridges throughout the study area, especially east of Thebes. Black oak and pignut hickory are the dominant trees; also important are white oak, scarlet oak, and red hickory (Carya ovalis). Important understory trees include shadbush (Amelanchier arborea), sassafras, winged elm (Ulmus alata), red maple (Acer rubrum), redbud (Cercis canadensis), and an occasional flowering dogwood. Typical shrubs include wild blackberry (Rubus allegheniensis), fragrant sumac (Rhus aromatica), southern blackhaw (Viburnum rufidulum), low-bush blueberry (Vaccinium vacillans), coralberry (Symphoricarpus orbiculatus) and devil's walking-stick (Aralia spinosa). Poison ivy and winter grape (Vitis aestivalis) were common vines. Poison ivy was the dominant plant of the herb layer; other important plants of the herb layer were elm-leaved

goldenrod (Solidago ulmifolia), woodland sunflower (Helianthus divaricatus), wild licorice (Galium circaeazans), dittany (Cunila origanoides), and tick-trefoil (Desmodium spp.).

Dry-mesic Upland Forest

Dry-mesic upland forest (Fig. 8) is the most widespread forest community in the study area. The dominant tree is white oak; other important trees include black oak, red oak (Quercus rubra), pignut hickory, red hickory, white ash (Fraxinus americana), shagbark hickory (Carya ovata), and tulip-poplar (Liriodendron tulipifera). Flowering dogwood was dominant in the understory, with sugar maple, beech, red mulberry (Morus rubra), slippery elm (Ulmus rubra), and pawpaw appearing as the forest becomes more mesic. Poison ivy and virginia creeper (Parthenocissus quinquefolia) are important vines and dominate the ground cover. Other important ground covers are false brome grass (Brachyelytrum erectum), sea oats (Chasmanthium latifolium), snakeroot (Sanicula spp.), small passion flower (Passiflora lutea), wild licorice, Christmas fern (Polystichum acrostichoides), and tick-trefoil (Desmodium spp.). On disturbed sites, Japanese honeysuckle (Lonicera japonica) and black locust (Robinia pseudoacacia) often invaded this community, with honeysuckle totally dominating the ground cover.

Mesic Upland Forest

Mesic upland forest (Fig. 9) occurred in ravines and drainages in the study area. Most sites that were formerly mesic forest have been converted to cropland. Dominant trees are beech, red oak, sugar maple, tulip-poplar, and sweetgum (Liquidambar styraciflua). Other important canopy trees are



Figure 8. Dry-mesic upland forest habitat along Transect C, Section 2, of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.



Figure 9. Mesic upland forest habitat along Transect A, Section 1, of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.

white oak, shagbark hickory, white ash, and American elm (Ulmus americana). Cucumber magnolia (Magnolia acuminata) and American basswood (Tilia americana) occur in mesic forest, as does eastern sycamore (Platanus occidentalis) along the drainages. The dominant understory tree is pawpaw, but spicebush (Lindera benzoin) and slippery elm are also locally important. Large vines of poison ivy, virginia creeper, and grapes occur in these forests. The herb layer shows a wide range of cover, usually depending on disturbance. It includes a diverse spring flora, with wake robin (Trillium recurvatum), spring beauty (Claytonia virginica), Dutchman's-breeches (Dicentra cucullaria), blue phlox (Phlox divaricata), wild geranium (Geranium maculatum), putty-root orchid (Aplectrum hyemale), goldenseal (Hydrastis canadensis), and toothwort (Dentaria laciniata). The moist ravines are rich in fern species: glade fern (Athyrium pycnocarpon), Christmas fern, Maidenhair fern (Adiantum pedatum), fragile fern (Cystopteris fragilis), sensitive fern (Onoclea sensibilis), and broad beech fern (Thelypteris hexagonoptera). Important summer herbs include wood-nettle (Laportea canadensis), clearweed (Pilea pumila), zig-zag goldenrod (Solidago caesia), and orange touch-me-not (Impatiens biflora). Wild hydrangea (Hydrangea arborescens) often occurs in mesic ravines.

3.3.2 Floodplain Forest Communities

Floodplain forest communities occur in the Lower Mississippi River Bottomlands Division of the study area. These floodplain forests belong to the classification of broad-leaved deciduous forested wetlands outlined by the United States Fish and Wildlife, USFWS (Cowardin et al. 1979). All of the trees on the study site are too small to be old-growth; frequent

disturbance by floods and man have prevented many sites on the floodplain from regenerating after the original lumbering.

The dominant tree is silver maple (Acer saccharinum) with an IV of 81.0 (Appendix B). Other important trees include cottonwood (Populus deltoides), black willow (Salix nigra), and green ash (Fraxinus pennsylvanica var. subintegerrima), with IV's of 55.8, 52.3, and 48.5, respectively (Appendix B). Summer grape (Vitis aestivalis), IV 38.9, was dominant in the sapling stratum. Herbaceous cover was 14.3%.

Soils are derived from alluvial materials, and there is a constant deposition of silt from flooding. During 1984, high waters lasted through July, and the water rose again in November. Only a few high areas probably escape annual flooding; on one of these sites was a small community of wet-mesic floodplain forest.

Wet-mesic Floodplain Forest

Wet-mesic floodplain forest had a relatively high diversity of trees compared to wet floodplain forest. Sweetgum was the dominant tree; other trees present were bur oak (Quercus macrocarpa), Shumard's oak (Quercus shumardii), kingnut hickory (Carya laciniosa), honey locust (Gleditsia triacanthos), pecan (Carya illinoensis), and pin oak (Quercus palustris). The understory was mostly spicebush with some pawpaw. Poison ivy and trumpet creeper (Campsis radicans) dominated the herbaceous layer.

Wet Floodplain Forest

Most of the floodplain was wet floodplain forest (Fig. 10). Cottonwood and silver maple predominated, especially on the better drained natural levees, with black willow and green ash in the poorer drained sites.



Figure 10. Wet floodplain forest habitat along lower Miller Creek, Section 1, in the Illinois Route 3 Study Area, Alexander County, Illinois; fall 1984.

Sycamore and sweetgum usually grow on the least drained sites above creek banks along Miller Creek. In much of the forest, there was no understory or herbaceous layer, aside from vines and Lemna minor on the moist soil. Common vines include trumpet creeper, wild grapes (Vitis aestivalis and V. palmata), and pepper vine (Ampelopsis arborea).

Where the canopy had opened, or along edges of oxbow ponds of Miller Creek, small areas of scrub-shrub wetlands (Cowardin et al. 1979) exist. Small stands of buttonbush (Cephalanthus occidentalis) are usually present, along with stiff dogwood (Cornus foemina), swamp privet (Forestiera acuminata), possum haw (Ilex decidua), and sandbar willow (Salix interior). Herbs were few, mostly annuals, such as clearweed and beggar's-ticks (Bidens comosa), but also dodder (Cuscuta gronovii) and lizard's tail (Saururus cernuus).

3.3.3 Successional Field Communities

This designation covers old fields (Fig. 11), abandoned pastures, abandoned road and railroad beds (Fig. 12), and roadsides. Dominant tree species include sycamore, yellow chestnut oak (Quercus muhlenbergii), and cottonwood, with IV's of 44.1, 38.8, and 37.9, respectively (Appendix B). Smooth sumac, IV 34.0, is dominant in the sapling stratum (Appendix B). Other important species of the sapling stratum invading these situations are box elder (Acer negundo), persimmon (Diospyros virginiana), sassafras, and American elm, with IV's ranging from 15.8-13.2 (Appendix B). Yellow chestnut oak was noted invading only on old road and railroad beds. Vines usually invaded with the woody vegetation; winter grape (Vitis cinerea), poison ivy, trumpet creeper, Virginia creeper, raccoon grape (Ampelopsis cordata), and honeysuckle often formed impenetrable tangles on abandoned



Figure 11. Successional field habitat along Transect E, Section 3, of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.



Figure 12. Successional field habitat along the abandoned railroad bed (proposed relocation route) in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.

rights-of-way (Fig. 13). Herbaceous cover averaged 55.5% (Appendix B), and species varied with the type of site. Abandoned fields and pastures were usually invaded by purpletop (Tridens flavus), broomsedge (Adropogon virginicus), brome (Bromus spp.), and other grasses. Panicked tick-trefoil (Desmodium paniculatum), slender mountain-mint (Pycnanthemum tenuifolium), hairy aster (Aster pilosus), goldenrods (Solidago nemoralis and S. canadensis), common milkweed (Asclepias syriaca), and wild carrot (Daucus carota) were frequent weedy forbs in old fields. Early invaders on abandoned rights-of-way were cottonweed (Froelichia gracilis), dwarf snapdragon (Chaenorhinum minus), and three-awn grass (Aristida oligantha). Other colonizing plants included mullein (Verbascum thapsus and V. blattaria), common ragweed (Ambrosia artemisiifolia), wild sensitive plant (Cassia nictitans), deptford pink (Dianthus armeria), and rough buttonweed (Diodia teres).

In fields abandoned because of frequent flooding, black willow and cottonwood quickly invade, forming dense thickets.

3.3.4 Pastureland

Pastures (Fig. 14) in the study area are maintained by grazing and mowing. Planted forage plants usually dominate the pasture throughout the year (Appendix B); these include meadow fescue (Festuca pratensis), Kentucky bluegrass (Poa pratensis), clovers (Trifolium repens and T. pratense), and Korean lespedeza (Lespedeza striata and L. stipulacea). During drought or due to over-grazing on favored sites, weeds may dominate, such as crabgrass (Digitaria sanguinalis), common ragweed, horseweed (Erigeron canadensis), and buckhorn (Plantago lanceolata).



Figure 13. Successional field habitat along the abandoned railroad bed (proposed relocation route) west of North Pond, Section 1, in the Illinois Route 3 Study Area, Alexander County, Illinois; fall 1984.



Figure 14. Pastureland habitat along Transect C, Section 2, of the Illinois Route 3 Study Area, Alexander County, Illinois; fall 1984.

Thorny forbs and shrubs may invade; honey locust, wild roses (Rosa multiflora and R. setigera), and nodding thistle (Carduus nutans) were frequently observed in pastures. Since most pastures were originally forest, often a few trees, such as oaks, hickories, beech, or hackberry (Celtis spp.) were left as shade for the cattle. Sassafras and sumac invade around edges of pastures.

3.4 TERRESTRIAL WILDLIFE

3.4.1 Amphibian and Reptile Sampling

Based on museum records and observations made during this study, 35 species of amphibians and reptiles are known to occur in the study area (Appendix C). Although some museum records are old (e.g., timber rattlesnake collected in 1939), there are recent observations of these species in the area and suitable habitat for them is extant.

An additional 32 species are potential, that is, have ranges covering the study area (Appendix C). There are records for 18 of these species within a few miles (kilometers) of the study area (Smith 1961; M. A. Morris, unpubl. data); since suitable habitat for these species exists in the area, these species are expected to be found. The remaining species may occur in the study area, but because habitat for them is lacking, they are not expected to be encountered.

3.4.2 Bird Sampling

Bird populations in Alexander County are extensive and diversified. A complete list of birds known or potential in the study area and season(s) when a species would be expected to occur on the area is given in Appendix

D. Potential species are those recorded for Alexander County from the literature and other sources, but not observed on the project area during this study. Over 200 bird species have been recorded for the county; of these, 112 species were observed on the study area. Over 30% of the species recorded for Alexander County are permanent residents, 27% are migratory birds, and the remaining species are either winter or summer residents.

Results of driving surveys for birds are presented in Appendix E. Of the 109 species recorded, 23 were migrants. The most abundant species, starling, was generally associated with pastureland and developed land (e.g., residential/farm buildings and roadsides/fencerows). Common grackle was next in order of abundance; during spring and fall, an influx of migratory flocks increased numbers of the species on the study area. Indigo bunting, blue jay, cardinal, and tufted titmouse were the most widely distributed species, each occurring at 30 of the 31 census stops.

Breeding bird densities generated by walking transect surveys (Table 3) indicated unpastured upland forest habitats contained the highest species diversity with 42 species identified. Successional field habitats supported the highest total bird density (225.4 birds per 100 acres (40 ha)). Pastureland contained the lowest bird density and few birds appeared to nest there. Most birds identified in this habitat were either observed foraging or associated with forest edge habitat.

3.4.3 Mammal Sampling

Based on observations made during this study, 23 species of mammals are known to occur in the study area (Appendix F). A review of literature indicated an additional 26 species are potential in the study area

Table 3. Estimated breeding bird densities (birds per 100 acres) based on walking transect surveys for the Illinois Route 3 Study Area; spring 1984.

Species ¹	Upland Forest (Pastured)	Upland Forest (Unpastured)	Floodplain Forest	Pastureland	Successional Field
Red-tailed hawk	--	0.7	--	--	--
Broad-winged hawk	--	--	--	--	3.9
Bobwhite	2.6	--	--	1.3	3.9
Yellow-billed cuckoo	5.3	2.6	--	--	--
Chimney swift	--	0.7	--	--	--
Ruby-throated hummingbird	--	0.4	--	--	--
Pileated woodpecker	--	0.4	--	--	--
Red-bellied woodpecker	2.6	--	4.2	--	--
Red-headed woodpecker	2.6	1.1	--	--	--
Hairy woodpecker	--	0.7	--	--	--
Downy woodpecker	5.3	5.2	4.2	2.6	3.9
Eastern phoebe	--	0.4	4.2	--	--
Great crested flycatcher	5.3	2.6	--	--	3.9
Acadian flycatcher	18.4	15.2	4.2	1.3	--
Eastern wood pewee	2.6	4.8	8.6	1.3	--
Purple martin	--	2.2	--	--	--
Blue jay	--	4.4	12.8	3.9	--
Common crow	--	0.4	--	--	--
Carolina chickadee	5.3	8.5	17.0	--	--
Tufted titmouse	7.9	16.4	29.8	7.7	7.9
White-breasted nuthatch	--	3.7	4.2	--	--
Carolina wren	--	--	8.6	--	--
Gray catbird	--	--	--	--	3.9
Brown thrasher	--	0.4	--	1.3	--
American robin	--	0.4	--	2.6	--
Wood thrush	5.3	0.4	4.2	--	--
Eastern bluebird	2.6	1.5	--	1.3	--
Blue-gray gnatcatcher	2.6	10.4	--	--	15.8
Loggerhead shrike	--	--	--	1.3	--
European starling	--	0.4	--	--	--
White-eyed vireo	2.6	3.0	12.8	--	3.9
Yellow-throated vireo	--	0.4	--	--	--
Red-eyed vireo	--	6.7	--	--	--
Prothonotary warbler	--	--	4.2	--	--
Swainson's warbler	--	0.4	--	--	--
Worm-eating warbler	--	4.1	--	--	--
Northern parula	2.6	1.1	--	--	--
Prairie warbler	5.3	--	--	--	3.9
Louisiana waterthrush	--	0.7	4.2	--	--
Kentucky warbler	10.5	1.9	--	--	--
Common yellowthroat	--	--	17.0	3.9	11.9
Yellow-breasted chat	--	0.7	4.2	--	31.7
Eastern meadowlark	--	--	--	5.1	--
Red-winged blackbird	--	--	--	3.9	--
Orchard oriole	--	1.1	--	3.9	15.8
Northern oriole	--	0.7	--	--	3.9
Common grackle	--	--	4.2	6.4	3.9
Brown-headed cowbird	10.5	8.5	--	45.1	11.9
Scarlet tanager	--	2.2	--	--	--
Summer tanager	--	2.6	4.2	--	3.9
Cardinal	7.9	11.9	12.8	1.3	11.9
Indigo bunting	15.8	11.5	42.8	12.9	27.6
American goldfinch	--	2.2	--	1.3	15.8
Rufous-sided towhee	5.3	0.7	--	--	11.9
Chipping sparrow	--	--	--	1.3	--
Field sparrow	--	--	--	9.0	23.7
Total Bird Density	131.8	147.8	209.1	118.4	225.4

¹ Birds listed in American Ornithologist's Union order.

(Appendix F). There are records for 21 of these species within a few miles (kilometers) of the study area; since suitable habitat for these species exists in the area, these species are expected to be found. The remaining species may occur in the study area, but because habitat for them is lacking, they are not expected to be encountered.

Relative abundance of small mammals in the study area based on live trapping is presented in Table 4. Six species of small mammals were captured with white-footed mouse being the most frequently caught species in all habitats. Short-tailed shrew was the next most frequently caught species and was captured in all but roadsides/fencerows habitat. Hoffmeister and Mohr (1972) indicated fewer than a dozen specimens of the southeastern shrew had been collected in Illinois. Capture of 4 southeastern shrews on the project area was notable and suggests the species may be common in the area.

Mist netting for bats was conducted at sites near the borrow pits and along lower Miller Creek. These sites were selected as they and lower Sexton Creek contained suspected bat foraging habitat and would incur the greatest impact from the relocation project. Sexton Creek could not be sampled due to its extensive width. No bats were captured and none were observed foraging near the trap sites. Several southern flying squirrels were captured at Trap Site 2 southwest of South Pond.

Habitat analysis indicated 100% of the riparian habitat along lower Sexton and Miller creeks was classified as Category II with no large, old-growth trees present. Woody vegetation associated with the creeks consisted predominantly of cottonwood and silver maple. Prolonged flooding of these areas also may reduce the quality of the area for bat foraging during much of the year.

Table 4. Relative abundance of small mammals in the Illinois Route 3 Study Area: spring and fall 1984.

Habitat Type	Species	Number of Catches ¹ (Recaptures)	Number of Trap-Nights	Number of Catches ¹ Per 100 Trap-Nights
Upland Forest - Pastured	White-footed mouse	10(2)	150	6.7
	Golden mouse	3(2)	150	2.7
	Short-tailed shrew	1(0)	150	0.7
	Southeastern shrew	<u>1(0)</u>	150	0.7
		15(4)		
	Percent of Total (184) Catches: 8.2			
	Percent of Total (2052) Trap-Nights: 7.3			
Upland Forest - Unpastured	White-footed mouse	62(11)	966	6.4
	Short-tailed shrew	15(0)	966	1.6
	Eastern chipmunk	5(0)	966	0.5
	Southeastern shrew	<u>2(0)</u>	966	0.2
		84(11)		
	Percent of Total (184) Catches: 45.7			
	Percent of Total (2052) Trap-Nights: 47.1			
Floodplain Forest	White-footed mouse	50(4)	495	10.1
	Eastern chipmunk	4(0)	495	0.8
	Short-tailed shrew	<u>3(0)</u>	495	0.6
		57(4)		
	Percent of Total (184) Catches: 31.1			
	Percent of Total (2052) Trap-Nights: 24.1			
Pastureland	Prairie vole	1(0)	261	0.4
	Short-tailed shrew	<u>1(0)</u>	261	0.4
		2(0)		
	Percent of Total (184) Catches: 1.1			
	Percent of Total (2052) Trap-Nights: 12.7			
Successional Field	White-footed mouse	8(0)	105	7.6
	Prairie vole	1(0)	105	1.0
	Short-tailed shrew	1(0)	105	1.0
	Golden mouse	<u>1(0)</u>	105	1.0
		11(0)		
	Percent of Total (184) Catches: 6.0			
	Percent of Total (2052) Trap-Nights: 5.1			
Roadsides/ Fencerows	White-footed mouse	13(0)	75	17.3
	Prairie vole	1(0)	75	1.3
	Southeastern shrew	<u>1(0)</u>	75	1.3
		15(0)		
	Percent of Total (184) Catches: 8.2			
	Percent of Total (2052) Trap-Nights: 3.7			

¹ Number of catches includes recaptures.

3.5 AQUATIC BIOTA

3.5.1 Hydrology

Morphological features of a drainage basin directly affects the limnological phenomena, distribution of biota, and productivity within the system. Certain features are important to consider as to how they will affect water quality, drainage, velocity, and other variables (Lind 1979). Such features as geology, soils, and climate (particularly rainfall) were previously described; others are described here.

Soil erosion and agricultural runoff affect water quality by carrying dissolved and suspended matter. In Alexander County, average annual soil loss due to erosion and runoff on cropland is 8.7 tons/acre/year (19.5 metric tons/ha/year) (Illinois Soil and Water Conservation Needs Inventory 1970).

Water levels on lower portions of Sexton and Miller creeks are directly affected by water levels of the Mississippi River. River stage readings at Cape Girardeau, Missouri (5.0 miles (8.0 km) northwest of Gale) over the 79 years-period 1897-1975 indicated daily river stage averaged 16.2 feet with extremes of 0.6 to 45.6 feet (St. Louis District, US Army Corps of Engineers, unpubl. data). Mean monthly river stages were above 16.2 feet from March through July with highest mean stages in April. Lowest mean monthly stages were in December. In 1984, river stage readings were generally consistent with these trends; the river was above flood stage (32.0 feet) during April and May and much of March, June, and July. Stages peaked at 38.9 feet on 27 April, and were lowest at 11.7 feet on 8 September.

3.5.2 Aquatic Habitats

Aquatic habitats were described according to the classification scheme outlined by the USFWS (Cowardin et al. 1979). This classification was used due to the acceptance of concepts outlined as the national and international standard for identifying wetlands (Tiner 1984). There are 5 major systems defined in the classification; of these, 3 were pertinent to this study: riverine, lacustrine, and palustrine. Riverine and lacustrine include both deepwater and wetland habitats; palustrine includes only wetland habitats. Wetlands and deepwater habitats are defined separately because traditionally wetlands do not contain deep permanent water. The classification of deepwater and wetland habitats within the study area is given in Table 5. Locations of these habitats in the study area are indicated in Fig. 15.

Sexton Creek

The northwest portion of Alexander County and southwest portion of Union County are drained by the Sexton Creek-Clear Creek drainage ditch. The ditch is 31.3 miles (50.4 km) long, has a northeast to southwest gradient, and drains 225 square miles (582.8 km²) of predominantly agricultural and timbered land (Healy 1979). The average annual runoff is 0.9 cubic foot per second (cfs) per square mile (0.01 cubic meter per second (cms) per square kilometer).

Sexton Creek heads in timbered hills in north central Alexander County and flows 8.3 miles (13.3 km) westward where it meets Clear Creek. It continues as a drainage ditch for 3.1 miles (5.0 km), flowing through the northern portion of the study area, and enters the Mississippi River at river mile 45.5. Sexton Creek has a drainage area of 19 square miles

Table 5. Descriptions of deepwater and wetland habitats in the Illinois Route 3 Study Area.

Habitat	System	Subsystem	Class/Subclass	Water Regime
Sexton Creek	Riverine	Lower perennial	Unconsolidated bottom/ Mud	Permanently flooded
Miller Creek	Riverine	Intermittent	Streambed/ Gravel (Riffle)	Intermittently exposed
			Streambed/ Sand (Pool)	Permanently flooded
North Pond	Lacustrine	Limnetic	Unconsolidated bottom/ Mud	Permanently flooded
South Pond	Lacustrine	Limnetic	Unconsolidated bottom/ Mud	Permanently flooded
		Littoral	Aquatic bed/ Vascular floating	Permanently flooded
			Emergent wetland/ Nonpersistent	Semipermanently flooded
Floodplain forest	Palustrine	-----	Forested wetland/ Broad-leaved deciduous	Seasonally flooded
			Scrub-shrub wetland/ Broad-leaved deciduous	Seasonally flooded
Oxbow pond	Palustrine	-----	Unconsolidated bottom/ Mud	Permanently flooded
Route 3 Pond	Palustrine	-----	Scrub-shrub wetland/ Broad-leaved deciduous	Seasonally flooded
			Unconsolidated bottom/ Mud	Permanently flooded

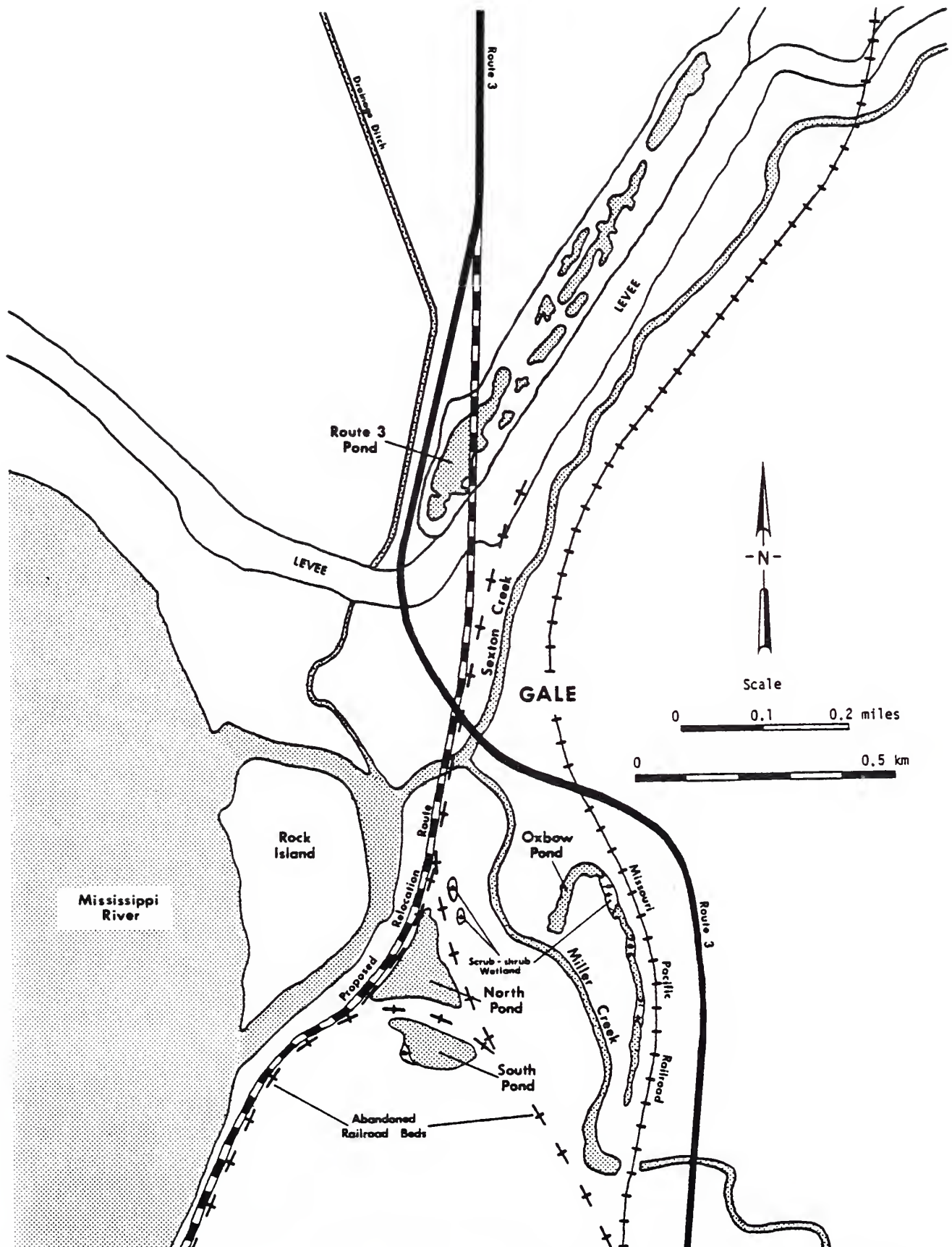


Figure 15. Location of aquatic habitats in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois.

(49.2 km²). Other physical characteristics can be seen in Table 6. The creek seasonally floods in spring inundating surrounding bottomlands; flooding conditions may last as long as 6 months (Allen 1968).

The lower 1.5 miles (2.4 km) of Sexton Creek (Fig. 16) was in the study area. Descriptive characteristics of sampling stations established on the creek are listed in Table 7.

Miller Creek

Miller Creek drainage basin is a 4th order intermittent system; it lies entirely in Alexander County and has a drainage area of 16 square miles (41.4 km²). Elevation is 510 feet at the source and 310 feet at the mouth with an average gradient of 30.1 feet/mile (5.7 m/km) (Allen 1968). The stream heads in timberlands and meanders through agricultural areas for 8.3 miles (13.4 km) flowing into Sexton Creek near Gale. The upper 5.8 miles (9.3 km) of the stream is typified by pools and riffles (Fig. 17) spaced at regular intervals; this is a common feature of streams unaltered by the activities of man. Beginning at a waste water treatment facility, the next 0.7 mile (1.1 km) appears to have been channelized. The remaining 1.8 miles (2.9 km) meander through low lying agricultural areas to the mouth.

Seven sampling stations were established along the creek. Descriptive characteristics of each station are listed in Table 8.

Borrow Pits

Two borrow pits, North Pond and South Pond, are located in Section 1 of the project area (Fig. 15). North Pond, approximately 4.4 acres (1.8 ha), is situated between railroad beds abandoned by the I.C.G. Railroad

Table 6. Physical characteristics of Sexton and Miller creeks in the Illinois Route 3 Study Area, Alexander County, Illinois.

Characteristic	Sexton Creek	Miller Creek
Length - miles (km)	12.4 (20.0)	8.3 (13.4)
Channelized - miles (km)	3.1 (5.0)	----
Unchannelized - miles (km)	9.3 (15.0)	8.3 (13.4)
Average Width - feet (m)	29.9 (9.1)	15.1 (4.6)
Gradient - feet/mile (m/km)	26.9 (5.1)	30.1 (5.7)
Surface Area - acres (ha)	43.5 (17.6)	14.6 (5.9)
Drainage Area - miles ² (km ²)	19.0 (49.2)	16.0 (41.4)

Table 7. Descriptive characteristics of sampling stations established on Sexton Creek, Alexander County, Illinois; 1984.

Characteristic	Station 1	Station 2	Station 3
County	Alexander	Alexander	Alexander
Topographic Quadrangle	Thebes	Thebes	Thebes
Township	T15S	T15S	T15S
Range	R3W	R3W	R3W
Section	SW1/4NW1/4 Section 4	NE1/4NW1/4 Section 4	SW1/4NE1/4 Section 33
Distance above Mouth - miles (km)	0.00 (0.00)	0.5 (0.8)	1.5 (2.4)
Point of Interest	Mississippi River mile 45.5	Route 3 bridge; Mouth of Miller Creek	Missouri Pacific Railroad bridge
Date	3 October	3 October	3 October
Average Width - feet (m)	45.0 (13.7)	25.0 (7.6)	24.5 (7.5)
Average Depth - feet (m)	4.5 (1.4)	1.5 (0.5)	1.5 (0.5)
Bottom Type	silt/mud	mud	mud
Elevation - feet	310	310	320
Average Velocity - feet/sec (m/sec)	0.20 (0.06)	1.10 (0.33)	0.00 (0.00)
Average Volume of Flow - feet ³ /sec (m ³ /sec)	32.50 (0.91)	47.14 (1.32)	-----

Table 8. Descriptive characteristics of sampling stations established on Miller Creek, Alexander County, Illinois; 1984.

Characteristic	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7
County	Alexander	Alexander	Alexander	Alexander	Alexander	Alexander	Alexander
Topographic Quadrangle	Thebes	Thebes	Thebes	Thebes	Thebes	Thebes	Thebes
Township	T15S	T15S	T15S	T15S	T15S	T15S	T15S
Range	R3W	R3W	R3W	R3W	R3W	R3W	R3W
Section	NW1/4SE1/4 Section 14	SE1/4SE1/4 Section 4	SE1/4SE1/4 Section 9	SE1/4SE1/4 Section 9	NW1/4NE1/4 Section 15	NE1/4SH1/4 Section 14	SE1/4NE1/4 Section 16
Distance above Mouth - miles (km)	0.60 (0.96)	1.80 (2.90)	2.80 (4.50)	3.20 (5.15)	3.90 (6.27)	4.97 (8.00)	3.60 (5.79)
Point of Interest	RR bridge	Sammons Creek	Road	Road and Bridge	Road	Road	Route 3
Date	14 November	14 November	2 October	2 October	1 October	1 October	2 October
Average Width - feet (m)	216.00 (65.84)	21.33 (6.50)	11.10 (3.38)	8.95 (2.73)	20.40 (6.22)	9.75 (2.97)	13.30 (4.05)
Average Depth - inches (cm)	155.9 (396.0)	7.9 (20.0)	6.8 (17.2)	1.2 (3.1)	3.8 (9.6)	4.8 (12.2)	4.5 (11.3)
Bottom Type	silt/ mud	silt/ gravel	silt/ gravel	gravel	silt/ gravel	gravel	gravel/ sand
Elevation - feet	340	340	340	360	360	380	360
Average Velocity - feet/sec (m/sec)	0.00 (0.00)	0.00 (0.00)	0.20 (0.06)	0.43 (0.13)	0.16 (0.05)	0.00 (0.00)	0.00 (0.00)
Average Volume of Flow - feet ³ /sec (m ³ /sec)	-----	-----	0.286 (0.008)	0.464 (0.013)	0.321 (0.009)	-----	-----



Figure 16. Sexton Creek and the abandoned I.C.G. Railroad bridge (proposed site for new highway bridge) in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.



Figure 17. Miller Creek above Station 4, Section 2, in the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984.

(Figs. 15, 18). Depth soundings, taken in October, indicated depths ranged from less than 1 to 8 feet (0.3 to 2.4 m) with a mean of 5.6 feet (1.8 m). The basin is triangular and characterized by steep-sided banks which account for the relatively few littoral areas within the system.

South Pond, approximately 2.7 acres (1.1 ha), is located south of North Pond and is situated between an abandoned railroad bed and a bluff (Fig. 15). Depth recordings, taken in November, indicated depths ranged from less than 1 to 12 feet (0.3 to 3.7 m) with a mean of 8.5 feet (2.6 m). Banks formed by the bluff and railroad beds are steep-sided, and depth drops drastically leaving few littoral areas. However, one area on the west side of the pond includes an aquatic bed (primarily Ceratophyllum) and an emergent wetland (primarily Typha sp.).

Wetlands

Wetlands are located in Section 1 of the study area. These palustrine systems are located south of the levee system at Gale, west of the Missouri Pacific Railroad, and north of the southern branches of the abandoned I.C.G. Railroad beds bordering North Pond (Fig. 15). The area is characterized primarily by deciduous forested wetlands (classified and cover mapped as floodplain forest in Section 3.3). Small islands of scrub-shrub wetlands occur where the canopy opens; others exist along oxbow ponds, a result of an old meander of Miller Creek, located between Miller Creek and the Missouri Pacific Railroad (Fig. 15). Descriptions of wetland habitats are given in Table 5.

Route 3 Pond is located north of the levee system at Gale and east of Route 3 (Fig. 15). It is comprised of scrub-shrub broad-leaved deciduous wetlands, which are seasonally flooded, and low lying areas that are permanently flooded (Fig. 19). Maximum depth, recorded in November in the



Figure 18. North Pond in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois; summer 1984. Note: picture taken looking north; proposed relocation route follows abandoned railroad bed on left.



Figure 19. Route 3 Pond in Section 1 of the Illinois Route 3 Study Area, Alexander County, Illinois; fall 1984. Note: picture taken looking northwest; proposed relocation route crosses pond at this point.

southwestern tip of open water, was 5.5 feet (1.7 m) with a mean of 4.3 feet (1.3 m).

3.5.3 Water Quality

Sexton Creek

Water quality data collected on Sexton Creek can be seen in Table 9. Rainfalls occurred during the sampling period but did not coincide with sampling dates. The spring sample was taken during flood stages; subsequent samples were taken during low flow periods. Dissolved oxygen ranged from 4.4 ppm in spring to 8.9 ppm in fall. This follows expected seasonal trends of lower oxygen during spring and summer and higher oxygen levels in fall. The amount of oxygen in water is a temperature dependent factor, i.e., the higher the temperature the lower the amount of dissolved oxygen in water. Specific conductance ranged from 300 to 950 micromhos (a normal range for freshwater streams). Higher values seen in fall may be due to a higher amount of dissolved and suspended materials in the water due to decomposition of leaf litter, less volume of water, and low flow. The pH of the stream ranged from 6.9 to 8.4 which is a natural range for freshwater. Variation of data from station to station was attributed to variations in the watershed.

Miller Creek

Water quality data for stations on Miller Creek are presented in Table 10. Water temperature ranged from 57 F (14 C) in fall to 88 F (31 C) in summer. Lowest dissolved oxygen values were recorded in summer in isolated pools, e.g., Station 6 which became an isolated pool during late summer. Conductance values ranged from 180 to 550 micromhos; pH ranged around

Table 9. Water quality data for Sexton Creek, Alexander County, Illinois; 1984.

	Date	Water Temperature F (C)	Dissolved Oxygen (ppm)	Specific Conductance (micromhos)	pH
Station 1	5/30	70 (21)	6.8	400	7.6
	7/24	84 (29)	6.8	450	7.3
	8/23	82 (28)	7.8	625	8.4
	10/4	64 (18)	8.9	950	7.5
Station 2	5/30	70 (21)	5.2	300	7.3
	7/24	86 (30)	7.2	400	7.1
	8/23	75 (24)	5.4	500	7.4
	10/4	61 (16)	8.4	850	7.9
Station 3	5/30	70 (21)	4.4	300	7.4
	7/24	86 (30)	7.8	400	6.9
	8/23	72 (22)	5.4	460	7.5

Table 10. Water quality data for Miller Creek, Alexander County, Illinois; 1984.

	Date	Water Temperature F (C)	Dissolved Oxygen (ppm)	Specific Conductance (micromhos)	pH
Station 1	5/30	70 (21)	5.4	200	7.5
	7/24	84 (29)	8.4	375	7.2
Station 2	6/15	88 (31)	7.5	400	6.9
	7/24	82 (28)	8.8	300	7.3
	8/15	86 (30)	4.6	510	7.2
Station 3	6/14	84 (29)	7.6	340	7.4
	7/26	79 (26)	5.4	310	7.2
	7/27	75 (24)	9.4	290	6.8
	9/28	57 (14)	9.0	250	7.2
Station 4	5/30	70 (21)	7.6	250	7.4
	7/26	82 (28)	3.8	310	7.3
	7/27	73 (23)	8.2	300	7.3
	9/28	59 (15)	9.1	255	7.6
Station 5	6/1	68 (20)	8.9	250	7.2
	7/26	86 (30)	6.4	360	7.9
	7/30	84 (29)	10.2	350	7.2
	8/14	75 (24)	8.2	410	7.3
	9/28	59 (15)	8.9	250	7.8
Station 6	6/1	72 (22)	6.4	190	7.9
	7/26	84 (29)	7.7	350	7.2
	8/14	82 (28)	3.6*	400	7.0
	9/28	64 (18)	8.0	180	6.9
Station 7	5/30	66 (19)	9.2	240	7.6
	7/26	81 (27)	8.0	550	7.5
	7/27	75 (24)	6.0	310	7.3
	9/28	57 (14)	9.0	240	7.7

* No flow; isolated pool.

neutral (6.8-7.9). Velocities recorded during July and August yielded a highest value of 0.43 feet/sec (0.13 m/sec) in a riffle area.

Borrow Pits

Water quality data for North and South ponds can be seen in Table 11. In North Pond, water temperature varied from 63 F (17 C) to 90 F (32 C). Dissolved oxygen ranged from 8.4 to 9.2 ppm which indicated the water was from 93% to 120% saturated, respectively. Specific conductance ranged from 225 to 350 micromhos. pH was slightly alkaline ranging from 7.3 to 8.8. Secchi disk readings, which give estimates of the depth of photosynthetic activity, were 2.92 feet (0.89 m) and 1.00 foot (0.31 m) in spring and summer, respectively.

South Pond water temperature varied from 63 F (17 C) in fall to 91 F (33 C) in summer. Dissolved oxygen values ranged from 8.6 to 9.2 ppm which indicated the water was 89 to 128% saturated, respectively. Specific conductance ranged from 195 to 250 micromhos; pH values ranged between 7.1 and 9.9. Secchi disk readings were 2.83 feet (0.86 m) and 2.17 feet (0.66 m) in spring and summer, respectively.

Dissolved oxygen values in both ponds indicated super saturation at the summer measurement. Dissolved oxygen tends to be higher in ponds than in streams due to a slower loss of oxygen to the atmosphere and a higher level of oxygen production from photosynthesis.

3.5.4 Fish Sampling

A list of fish species known and potential in the Route 3 study area is given in Appendix G. A total of 48 species of fish representing 28 genera and 15 families was collected in the study area during 1984. Smith (1979) reported 69 species of fish collected in streams and lakes of

Table 11. Water quality data for North and South ponds, Alexander County, Illinois; 1984.

	Date	Water Temperature F (C)	Dissolved Oxygen (ppm)	Specific Conductance (micromhos)	pH	Secchi Disk feet (m)
North Pond	5/30	72 (22)	8.4	350	7.3	2.92 (0.89)
	7/24	82 (28)	9.0	250	7.6	1.00 (0.31)
	8/14	90 (32)	9.0	300	8.6	
	10/4	63 (17)	9.2	225	8.8	
South Pond	5/30	73 (23)	8.6	250	7.1	2.83 (0.86)
	7/24	86 (30)	8.6	195	7.4	2.17 (0.66)
	8/14	91 (33)	9.2	225	8.8	
	10/4	63 (17)	8.8	200	9.9	

Alexander County. The 48 species of fish collected in the present study represent 70% of the species known from the county. For Illinois, Smith (1979) provided accounts of 199 species of fish. Of these, 13 species are not native but occur in the state through natural dispersal after human modification of watersheds (Smith 1979); 9 species have been extirpated, and 3 species have not been collected in the state for more than 15 years. This leaves 174 native species of fish plus 13 introduced species for a total of 187 species collected in Illinois. The 48 species of fish collected in the study area represent 26% of the fish known from the state.

Sexton Creek

A total of 16 species of fish representing 14 genera and 11 families was collected in Sexton Creek during 1984 (Table 12). This represents 23% and 9% of the species known from the county and state, respectively. Gizzard shad was the most abundant fish collected. Carp and white bass were common occurring in 75% and 50% of the samples, respectively. Carp comprised 6% and white bass 2% of the total fish collected in Sexton Creek. Other species were either uncommon or rare.

Data obtained from the Illinois Natural History Survey indicated 50 species of fish were collected from 1959-1965 in Sexton Creek (Appendix H). During the present study, only 16 species of fish were collected; of these, 4 had not been previously collected. This low number can be attributed to sampling only the channelized portion of the stream; previous collections included the entire stream from headwaters to mouth. Three of the species not previously collected were chestnut lamprey, bigmouth buffalo, and flathead catfish. These fish are large river species and were collected at the mouth of Sexton Creek. Spotted gar, the fourth species, occurs in streams, lakes, and swamps and prefers relatively quiet pools. Spotted

Table 12. Total number of fish collected and their relative abundances at stations on Sexton Creek, Alexander County, Illinois, 1984.

Species	Relative Abundance*	Station 1			Station 2			Station 3		Total (%)
		5/30	7/24	10/4	5/30	7/24	10/4	5/30	7/24	
Petromyzontidae										
Chestnut lamprey	R	-	-	1	-	-	-	-	-	1 (0.25)
Lepisosteidae										
Spotted gar	U	-	2	2	-	-	-	-	-	4 (1.01)
Shortnose gar	R	-	-	-	3	-	-	-	-	3 (0.76)
Clupeidae										
Gizzard shad	A	87	5	6	4	160	4	34	28	328 (83.25)
Cyprinidae										
Common carp	C	-	1	10	2	-	1	1	8	23 (5.84)
Catostomidae										
Smallmouth buffalo	R	-	-	-	-	-	-	1	-	1 (0.25)
Bigmouth buffalo	U	-	-	-	1	-	-	1	3	5 (1.27)
Ictaluridae										
Channel catfish	R	-	-	4	-	-	-	-	-	4 (1.02)
Flathead catfish	R	-	-	1	-	-	-	-	-	1 (0.25)
Atherinidae										
Brook silverside	R	-	-	1	-	-	-	-	-	1 (0.25)
Percichthyidae										
White bass	C	-	2	4	-	-	1	-	1	8 (2.03)
Centrarchidae										
Bluegill	U	-	-	1	1	-	1	-	-	3 (0.76)
Largemouth bass	U	-	-	1	-	-	-	1	2	4 (1.02)
White crappie	U	-	-	1	-	-	1	-	2	4 (1.02)
Percidae										
Sauger	R	-	-	-	1	-	-	-	-	1 (0.25)
Sciaenidae										
Freshwater drum	U	-	-	-	-	2	-	-	1	3 (0.76)
Subtotal		87	10	32	12	162	8	38	45	
Total			129			182		83		394 (100)
Species represented		1	4	11	6	2	5	5	7	16
Families represented		1	4	8	6	2	4	4	6	11

* Relative abundance: A-abundant; C-common; U-uncommon; R-rare.

gars have been reported in Miller Creek and it is suspected that they migrated from there when flood waters receded in spring.

Miller Creek

A total of 39 species of fish representing 24 genera and 12 families was collected in Miller Creek during 1984 (Table 13). This represents 56% and 21% of the species known from the county and state, respectively. Relative abundance of fish in Miller Creek is given in Table 13. Central stonerollers, creek chubs, orangethroat darters, and blackspotted topminnows occurred in 50 to 85% of the samples and were classified as common. Of the total fish collected in Miller Creek, central stonerollers comprised 25%, creek chubs 19%, gizzard shad 9%, orangethroat darters 8%, and blackspotted topminnows 4%.

Seasonal changes in the fish community can be seen in the Miller Creek collections. In spring, average number of fish collected per station was 86; in summer, this increased to 102 fish per station. This is a normal increase due to young-of-the-year fish being collected in summer. The fall collection averaged 64 fish per station. This lower value was attributed to natural mortality and downstream migration of fish due to low water levels. Difference in spring and fall values was attributed to spawning migrations of fish during spring.

Data obtained from ichthyology records from the Illinois Natural History Survey and the Department of Zoology, Southern Illinois University at Carbondale indicated 34 species of fish were collected from 1964-1982 in Miller Creek (Appendix I). In the present study, 39 species of fish were collected, 13 of which had not been previously collected. Eight species of fish collected in 1964 were not present in the 1984 sample. Over the past 20 years, 47 species of fish have been collected in Miller Creek. The

Table 13. Total number of fish collected and their relative abundances at stations on Miller Creek, Alexander County, Illinois, 1984.

Species	Relative Abundance*	Station 1		Station 2	Station 3			Station 4		
		5/30	7/24	7/24	6/14	7/26	9/28	5/31	7/26	9/28
Amiidae										
Bowfin	R	-	1	-	-	-	-	-	-	-
Clupeidae										
Skipjack herring	R	1	-	-	-	-	-	-	-	-
Gizzard shad	U	24	90	24	-	-	1	-	-	-
Esocidae										
Grass pickerel	R	-	-	-	3	-	-	-	-	-
Cyprinidae										
Central stoneroller	C	-	-	-	-	1	-	118	54	25
Common carp	U	3	2	3	-	2	1	-	-	-
Golden shiner	R	-	-	-	-	-	-	-	-	1
Emerald shiner	U	-	-	4	-	-	-	-	9	1
Bigeye shiner	U	-	-	-	4	-	-	74	-	-
Red shiner	U	-	-	2	4	-	-	6	1	6
Redfin shiner	R	-	-	-	15	-	-	19	-	1
Blacktail shiner	R	-	-	-	2	-	-	-	-	-
Bluntnose minnow	U	-	-	-	12	-	-	16	2	18
Creek chub	C	-	-	-	-	-	-	3	4	1
Catostomidae										
River carpsucker	U	-	1	-	-	-	-	-	-	-
Creek chubsucker	U	-	-	-	-	-	-	2	3	-
Smallmouth buffalo	R	-	-	1	1	-	-	-	-	-
Bigmouth buffalo	R	1	1	1	-	-	-	-	-	-
Ictaluridae										
Black bullhead	R	-	-	16	-	-	-	-	1	-
Yellow bullhead	R	-	-	-	-	1	-	-	-	-
Aphredoderidae										
Pirate perch	R	-	-	-	-	1	1	-	-	-
Cyprinodontidae										
Blackstripe topminnow	R	-	-	-	-	12	1	-	-	6
Blackspotted topminnow	C	-	-	1	1	23	11	1	4	-
Percichthyidae										
White bass	R	5	5	-	-	-	-	-	-	-
Centrarchidae										
Green sunfish	R	-	-	-	-	4	-	-	-	-
Orangespotted sunfish	R	-	-	1	-	28	-	-	-	-
Bluegill	U	-	1	4	16	4	-	-	-	-
Longear sunfish	R	-	-	-	-	-	-	-	-	-
Redear sunfish	U	-	-	1	-	-	2	-	2	1
Spotted bass	R	-	-	-	-	-	1	-	1	11
Largemouth bass	U	1	2	7	5	6	-	-	-	-
White crappie	R	-	2	4	-	-	-	-	-	-
Black crappie	U	-	-	1	-	-	1	-	4	-
Percidae										
Mud darter	R	-	-	-	-	1	-	-	3	-
Bluntnose darter	R	-	-	-	2	-	1	-	-	-
Slough darter	R	-	-	-	18	-	-	-	-	-
Orangethroat darter	C	-	-	-	2	-	-	18	9	2
Loggerhead	U	-	-	1	2	-	1	-	2	3
Sciaenidae										
Freshwater drum	R	-	4	-	-	-	-	-	-	-
Subtotal		35	109	71	87	83	21	257	99	76
Total		144		71	191			432		
Species represented		6	10	15	14	11	10	9	14	12
Families represented		5	7	7	6	6	6	4	6	5

* Relative abundance: A-abundant; C-common; U-uncommon; R-rare.

Table 13. Continued

Species	Station 5			Station 6			Station 7			Total (%)
	6/1	7/26	9/28	6/1	7/26	9/28	5/31	7/26	9/28	
Amiidae										
Bowfin	-	-	-	-	-	-	-	-	-	1 (0.06)
Clupeidae										
Skipjack herring	-	-	-	-	-	-	-	-	-	1 (0.06)
Gizzard shad	-	-	-	-	-	-	-	-	-	39 (8.98)
Esocidae										
Grass pickerel	-	-	-	-	-	-	-	-	-	3 (0.19)
Cyprinidae										
Central stoneroller	6	29	35	10	77	1	17	14	2	389 (25.14)
Common carp	-	-	-	-	-	-	-	-	-	11 (0.71)
Golden shiner	-	-	-	-	-	-	2	-	-	3 (0.19)
Emerald shiner	-	1	-	-	-	-	-	-	-	15 (0.97)
Bigeye shiner	1	-	6	1	-	-	-	-	-	86 (5.56)
Red shiner	-	-	-	-	-	-	-	-	-	19 (1.23)
Redfin shiner	-	-	-	-	-	-	-	-	-	35 (2.26)
Blacktail shiner	1	-	-	-	-	-	-	-	-	3 (0.19)
Bluntnose minnow	-	-	5	-	-	-	-	-	-	53 (3.43)
Creek chub	6	5	101	21	145	13	3	-	-	302 (19.50)
Catostomidae										
River carpsucker	-	-	-	-	-	-	-	-	-	1 (0.06)
Creek chubsucker	-	-	-	-	4	-	2	6	9	26 (1.68)
Smallmouth buffalo	-	-	-	-	-	-	-	-	-	2 (0.13)
Bigmouth buffalo	-	-	-	-	-	-	-	-	-	3 (0.19)
Ictaluridae										
Black bullhead	-	-	-	-	-	-	-	-	-	17 (1.10)
Yellow bullhead	-	3	-	-	-	-	-	-	-	4 (0.26)
Aphredoderidae										
Pirate perch	-	-	-	-	-	-	1	-	-	3 (0.19)
Cyprinodontidae										
Blackstripe topminnow	-	-	-	-	-	9	-	4	2	34 (2.20)
Blackspotted topminnow	1	1	-	1	23	-	-	2	-	69 (4.46)
Percichthyidae										
White bass	-	-	-	-	-	-	-	-	-	10 (0.65)
Centrarchidae										
Green sunfish	-	-	-	-	-	-	-	7	7	18 (1.16)
Orangespotted sunfish	-	-	-	-	-	-	-	5	-	34 (2.20)
Bluegill	-	-	-	1	-	-	2	4	-	32 (2.07)
Longear sunfish	-	1	-	-	-	-	-	-	2	3 (0.19)
Redear sunfish	-	-	-	-	-	-	-	-	6	12 (0.78)
Spotted bass	-	-	-	-	-	-	-	-	-	13 (0.84)
Largemouth bass	-	-	-	-	-	-	-	-	-	21 (1.36)
White crappie	-	-	-	-	-	-	-	-	-	6 (0.39)
Black crappie	-	-	-	-	-	-	-	-	3	9 (0.58)
Percidae										
Mud darter	-	-	-	-	-	-	-	-	-	4 (0.26)
Bluntnose darter	-	-	-	-	-	3	-	-	-	6 (0.39)
Slough darter	-	-	-	-	-	-	-	-	-	18 (1.16)
Orangethroat darter	26	2	1	20	11	10	14	4	-	119 (7.69)
Loggerhead	-	2	6	-	-	-	-	-	2	19 (1.23)
Sciaenidae										
Freshwater drum	-	-	-	-	-	-	-	-	-	4 (0.26)
Subtotal	41	44	154	54	260	36	41	46	33	
Total		239			350			120		1547 (99.95)
Species represented	6	8	6	6	5	5	7	8	8	39
Families represented	3	5	2	4	4	3	5	5	5	12

difference in species collected was attributed to different sampling stations, habitats, and sampling methods.

Borrow Pits

In North Pond, a total of 16 species of fish representing 11 genera and 9 families was collected during 1984 (Table 14). This represents 23% of species known from the county and 9% of those known from the state. Seven species (Centrarchids) collected are considered sport fish and represented 72% of the total fish collected.

In South Pond, a total of 9 species of fish representing 6 genera and 4 families was collected during 1984 (Table 14). This represents 13% and 5% of the species known from the county and state, respectively. Six species of sport fish were collected and represented 94% of the total fish collected.

In both borrow pits, 18 species of fish representing 12 genera and 9 families were collected during the study. Sport fish comprised 81% of the total fish collected. These data indicate that a fairly healthy fishery is supported by the borrow pits.

Route 3 Pond

One collection of fish was made in Route 3 Pond on 4 October. This pond is influenced greatly by flood waters and, as would be expected, the fish collected there were also collected in Sexton and Miller creeks. Eleven species of fish were collected representing 9 genera and 7 families. Fish collected were bowfin, spotted gar, gizzard shad, carp, bigmouth buffalo, black bullhead, warmouth, bluegill, largemouth bass, white crappie, and black crappie.

Table 14. Relative abundance and number of fish collected in North Pond and South Pond, Alexander County, Illinois, 1984.

Species	Relative Abundance*	North Pond				South Pond			
		5/30	7/24	10/4	Total (%)	5/30	7/24	10/4	Total (%)
Lepisosteidae									
Spotted gar	R	-	-	2	2 (0.71)	-	-	-	-
Clupeidae									
Gizzard shad	C	-	18	7	25 (8.90)	4	4	3	11 (5.16)
Cyprinidae									
Common carp	C	1	1	1	3 (1.07)	-	1	-	1 (0.47)
Catostomidae									
River carpsucker	R	2	-	-	2 (0.71)	-	-	-	-
Smallmouth buffalo	U	1	2	-	3 (1.07)	-	-	-	-
Bigmouth buffalo	C	16	15	5	36 (12.81)	-	-	-	-
Ictaluridae									
Flathead catfish	R	-	-	-	-	1	-	-	1 (0.47)
Atherinidae									
Brook silverside	U	4	1	-	5 (1.78)	-	-	-	-
Centrarchidae									
Green sunfish	U	-	-	-	-	1	-	4	5 (2.35)
Warmouth	U	-	-	2	2 (0.71)	-	-	1	1 (0.47)
Orangespotted sunfish	R	-	1	-	1 (0.36)	-	-	-	-
Bluegill	A	38	94	38	170 (60.50)	16	79	44	139 (65.26)
Redear sunfish	C	-	1	-	1 (0.36)	1	1	-	2 (0.94)
Largemouth bass	A	7	3	11	21 (7.46)	6	37	7	50 (23.47)
White crappie	C	-	2	3	5 (1.78)	-	1	2	3 (1.41)
Black crappie	U	-	1	1	2 (0.71)	-	-	-	-
Percidae									
Johnny darter	R	-	1	-	1 (0.36)	-	-	-	-
Sciaenidae									
Freshwater drum	U	1	1	-	2 (0.71)	-	-	-	-
Total		70	141	70	281 (100)	29	123	61	213 (100)
Species represented		8	13	9	16	6	6	6	9
Families represented		5	7	5	8	3	3	2	4

* Relative abundance: A-abundant; C-common; U-uncommon; R-rare.

3.5.5 Mussel Sampling

No previous mussel sampling has been done in the Sexton Creek/Clear Creek drainage system. A list of mussels collected in southern Illinois has been published (Ulffers 1855). According to Fuller (1980), 37 species of mussels have recently been collected in the upper Mississippi River; 20 species have been reported below Lock and Dam 26 (Perry 1979). From the above literature, a list was compiled to determine potential occurrence in the Route 3 Study Area (Appendix J). Habitat requirements (Baker 1906, Goodrich et. al. 1944, Parmalee 1967, Fuller 1980) and fish host species (Clarke 1973, Baker 1928, Fuller 1980) were also studied to determine expected occurrence. It was determined that 20 species may occur in Miller and Sexton creeks, but only 14 are expected based on habitat and presence of fish host species in the study area.

No live specimens of mussels were collected in the study area. Six dead specimens were collected along Miller Creek between Stations 1 and 2 during July and August. Four species representing 3 genera and 1 family were collected (Appendix J). Western pondmussel and paper floater are small stream species; giant floater and pink papershell are medium to large river species. All prefer a mud bottom in water with little or no current, which is the dominant habitat type between Stations 1 and 2.

3.5.6 Macroinvertebrate Sampling

Sexton Creek

Aquatic macroinvertebrate sampling in Sexton Creek yielded 18 taxa representing 17 families (Appendix K). Dipterans were the predominant taxonomic group encountered at all stations. Taxa ranged from 2 at Station 2 to 12 at Station 3 (Table 15).

Table 15. Qualitative macroinvertebrate sample data from Sexton Creek, Alexander County, Illinois; 1984.

Macroinvertebrates	Station: 1	2	3
INTOLERANT			
<u>Palaemonetes</u> sp.	-	-	4
<u>Peltoperia</u> sp.	-	-	1
MODERATE			
<u>Lirceus</u> sp.	-	-	4
<u>Hydropsychidae</u>	2	-	-
<u>Simuliidae</u>	-	-	5
<u>Sphaerium</u> sp.	-	-	10
FACULTATIVE			
<u>Caenis</u> sp.	-	-	34
<u>Hexagenia</u> sp.	4	1	-
<u>Chrysops</u> sp.	1	-	-
TOLERANT			
<u>Tubificidae</u>	5	-	-
<u>Lumbriculidae</u>	2	-	1
<u>Haplotaxus gordiodes</u>	-	-	1
<u>Hirundinea</u>	-	-	14
<u>Chaoborus</u> sp.	2	-	5
<u>Chironomus</u> sp.	1	-	3
<u>Pentaneura</u> sp.	2	-	1
<u>Sciomyzidae</u>	-	2	-
<u>Limnophora</u> sp.	1	-	-
Total number of organisms	20	3	83
% Intolerant organisms	0	0	6
% Moderate organisms	10	0	23
% Facultative organisms	25	33	41
% Tolerant organisms	65	67	30
Total Intolerant taxa	0	0	2
Total Moderate taxa	1	0	3
Total Facultative taxa	2	1	1
Total Tolerant taxa	6	1	6
Total number of taxa	9	2	12
Stream classification*	SP	SP	SP

* SP - Semi-polluted Environment

Intolerant organisms ranged from 0-6% of macroinvertebrate collections in Sexton Creek; based on their abundance, the stream environment was classified as semi-polluted. However, it is important to note that aquatic communities cannot be placed into neatly defined stream classifications to reflect environmental conditions. Many factors, including genetic factors and environmental conditions, affect the presence or absence of macroinvertebrates. The Sexton Creek macroinvertebrate population is typical of channelized streams. The mud bottom and low habitat diversity accounts for the presence of aquatic worms and fly larvae.

Miller Creek

In Miller Creek, 61 aquatic macroinvertebrate taxa representing 41 families and 13 major groups were collected (Appendix K). In terms of relative abundance, Ephemeroptera (24.5%), Diptera (22.3%), and Mollusca (10.8%) comprised over one-half of the organisms collected. Other groups, in decreasing order of abundance, were: Tricoptera (8.8%), Annelida (6.9%), Isopoda (6.1%), Amphipoda (5.6%), Odonata (4.5%), Coleoptera (4.5%), Hemiptera (3.8%), Decapoda, Plecoptera, and Nematoda.

Dominant organisms were Chironomidae which made up 66.7% of the Diptera and 14.9% of Miller Creek organisms. Chironomids were collected at all stations, but greatest numbers were obtained at Stations 1 and 2 where habitat is predominantly quiet water and mud bottoms. The next most prevalent organism, Caenis sp., made up 49.5% of the Ephemeropterans (mayflies) and 11.9% of the total organisms collected. Most (91.7%) of the Ephemeropterans were collected at Stations 3-7, which were pool/riffle areas of sand and gravel.

Intolerant organisms ranged from 0% at Station 1 to 33% at Station 4 (Table 16). Based on the abundance of intolerant organisms at Stations 1

Table 16. Qualitative macroinvertebrate sample data from Miller Creek, Alexander County, Illinois; 1984.

Macroinvertebrates	Station:	1	2	3	4	5	6	7
INTOLERANT								
<u>Hyaella azteca</u>	-	-	5	-	-	-	-	-
<u>Orconectes</u> sp.	-	-	-	2	-	-	-	-
<u>Palaemonetes</u> sp.	-	-	1	-	-	-	-	-
<u>Peltoperia</u> sp.	-	1	-	-	-	-	-	-
<u>Isoperla</u> sp.	-	-	-	-	1	-	-	-
<u>Baetis</u> sp.	-	-	1	-	-	-	-	2
<u>Heptageniidae</u>	-	-	-	-	-	-	5	-
<u>Stenacron</u> sp.	-	-	-	-	-	-	-	2
<u>Stenonema</u> sp.	-	-	15	12	10	-	-	7
<u>Choroterpes</u> sp.	-	-	-	2	-	-	-	-
<u>Philopotamidae</u>	-	-	-	3	2	-	-	2
<u>Hexatoma</u> sp.	-	-	-	2	-	-	-	-
MODERATE								
<u>Asellus</u> sp.	-	-	3	2	4	2	11	-
<u>Lirceus</u> sp.	-	-	4	-	-	-	1	-
<u>Agrion</u> sp.	-	-	-	-	1	-	-	-
<u>Coanagrionidae</u>	-	-	1	-	-	-	-	-
<u>Amphiagrion</u> sp.	-	-	8	-	-	-	1	-
<u>Argia</u> sp.	-	-	1	-	1	-	-	-
<u>Ischnura</u> sp.	-	-	-	-	-	1	-	-
<u>Boveria</u> sp.	1	-	-	-	-	-	-	-
<u>Cordulia</u> sp.	-	-	3	-	-	-	-	-
<u>Dorocordulia</u> sp.	-	-	2	-	-	-	-	-
<u>Polycentropodidae</u>	-	-	-	6	2	-	3	-
<u>Hydropsychidae</u>	-	-	1	4	3	-	10	-
<u>Lepidostomatidae</u>	-	-	-	-	-	-	2	-
<u>Lepidostoma</u> sp.	-	-	-	-	-	-	1	-
<u>Simulium</u> sp.	-	3	-	-	-	-	-	-
FACULTATIVE								
<u>Gammarus</u> sp.	-	-	-	2	12	-	6	-
<u>Caenis</u> sp.	6	3	13	5	8	6	12	-
<u>Corixidae</u>	-	-	1	-	-	-	-	-
<u>Gerris</u> sp.	-	-	1	-	-	-	-	-
<u>Trepobates</u> sp.	-	-	4	1	2	-	1	-
<u>Ranatra</u> sp.	-	-	-	1	-	-	-	-
<u>Microvelia</u> sp.	-	-	-	1	3	-	-	-
<u>Velia</u> sp.	-	-	-	1	-	-	-	-
<u>Ragovelia</u> sp.	-	-	-	1	-	-	-	-
<u>Dytisidae</u>	-	-	-	-	1	-	-	-
<u>Copelatus</u> sp.	-	-	-	-	-	1	-	-
<u>Dytiscus</u> sp.	1	-	-	-	-	-	1	-
<u>Hydrovatus</u> sp.	-	-	-	-	1	-	-	-
<u>Dineutus</u> sp.	-	2	2	-	1	-	-	-
<u>Berosus</u> sp.	-	1	-	-	-	-	-	-
<u>Cymbiodyta</u> sp.	-	-	-	2	-	-	-	-
<u>Helophorus</u> sp.	-	1	-	-	-	-	-	-
<u>Hydrobius</u> sp.	1	-	-	-	-	-	-	-
<u>Hydrophilus</u> sp.	-	-	-	-	1	1	1	-
<u>Tropisternus</u> sp.	-	-	1	-	-	-	-	-
<u>Stenelmis</u> sp.	-	-	-	-	-	-	1	-
<u>Ferrisa</u> sp.	-	-	-	-	1	-	-	-

Table 16. Continued.

Macroinvertebrates	Station:	1	2	3	4	5	6	7
TOLERANT								
Nematoda		1	-	-	-	-	-	-
Naididae		3	-	-	-	-	-	-
Tubificidae		24	-	-	-	-	-	-
<u>Branchiura sowerbyi</u>		-	-	2	-	-	-	-
<u>Hirudinea</u>		1	-	-	-	-	-	1
<u>Anopheles</u> sp.		-	-	-	-	2	-	-
<u>Culex</u> sp.		-	-	1	-	-	-	-
<u>Chaoborus</u> sp.		23	-	-	-	-	-	-
Psychodidae		-	-	-	3	-	-	-
Chironomidae		3	6	1	3	5	-	3
Chironomus sp.		15	15	-	-	-	3	-
<u>Pentaneura</u> sp.		4	-	3	-	-	-	5
<u>Stratiomys</u> sp.		1	-	-	-	-	-	-
<u>Syrphidae</u>		-	1	-	-	-	-	-
<u>Physsa</u> sp.		-	-	7	10	3	19	8
Total number of organisms		84	33	81	63	64	38	81
% Intolerant organisms		0	3	27	33	20	13	16
% Moderate organisms		1	9	28	19	17	8	36
% Facultative organisms		10	21	27	22	47	21	27
% Tolerant organisms		89	67	18	26	16	58	21
Total Intolerant taxa		0	1	4	5	3	1	4
Total Moderate taxa		1	1	8	3	5	2	7
Total Facultative taxa		3	4	6	8	9	3	6
Total Tolerant taxa		9	3	5	3	3	2	4
Total number of taxa		13	9	23	19	20	8	21
Stream classification*		SP	SP	UB	UB	UB	UB	UB

* SP - Semi-polluted Environment
 UB - Unbalanced Environment

and 2, stream environs were classified as semi-polluted. In this stretch, macroinvertebrate populations were similar to those collected in Sexton Creek with most organisms being those that prefer quiet water and mud bottoms. At Stations 3-7, macroinvertebrate populations were typical of pool/riffle habitats as most organisms collected were characteristic of rock riffle areas (Hynes 1970). The change in community composition between Stations 2 and 3 may be attributed to effluent from a wastewater treatment facility located 0.3 mile (0.5 km) downstream from Station 3. Input of organics reduces intolerant organisms and is conducive to providing habitats preferred by tolerant organisms.

Borrow Pits

In North Pond, 18 families of macroinvertebrates representing 9 major groups were collected (Appendix K). In terms of relative numbers, Ephemeroptera (26.5%) and Odonata (25.0%) comprised over one-half of all organisms collected. Other groups, in decreasing order of abundance, were: Diptera (19.1%), Hemiptera (7.3%), Coleoptera (5.9%), Annelida (4.4%), Plecoptera (4.4%), Mollusca (4.4%), and Decapoda (2.9%). Intolerant organisms made up 2.9% of the sample while facultative organisms made up 55.9% of the total collected (Table 17).

In South Pond, 16 families representing 8 major groups were collected (Appendix K). In terms of relative numbers, Odonata (40.4%) and Diptera (20.6%) comprised more than one-half of all organisms collected. Other groups, in decreasing order of abundance, were: Ephemeroptera (15.6%), Mollusca (14.9%), Hemiptera (5.0%), Tricoptera (1.4%), Coleoptera (1.4%), and Annelida (0.7%). No intolerant organisms were collected (Table 17).

Table 17. Qualitative macroinvertebrate sample data from North Pond and South Pond, Alexander County, Illinois; 1984.

Macroinvertebrates	North Pond	South Pond
INTOLERANT		
<u>Palaemonetes</u> sp.	2	-
MODERATE		
<u>Amphiagrion</u> sp.	-	44
<u>Ischnura</u> sp.	2	-
<u>Boyeria</u> sp.	3	-
<u>Dorocordulia</u> sp.	8	10
<u>Pantala</u> sp.	-	3
FACULTATIVE		
<u>Perltoyerla</u> sp.	3	-
<u>Caenis</u> sp.	18	22
<u>Gomphus</u> sp.	4	-
<u>Corixidae</u>	1	1
<u>Trepobates</u> sp.	2	5
<u>Ranatra</u> sp.	2	1
<u>Leptoceridae</u>	-	2
<u>Peltodytes</u> sp.	3	-
<u>Hydrovatus</u> sp.	1	1
<u>Hydrobius</u> sp.	-	1
<u>Odontomyia</u> sp.	1	-
<u>Gyraulus</u> sp.	-	7
<u>Lymnaea</u> sp.	3	-
TOLERANT		
<u>Tubificidae</u>	3	1
<u>Anopheles</u> sp.	2	-
<u>Culex</u> sp.	-	6
<u>Chaoborus</u> sp.	7	19
<u>Chironomidae</u>	3	4
<u>Physa</u> sp.	-	14
Total number of organisms	68	141
% Intolerant organisms	3	0
% Moderate organisms	19	40
% Facultative organisms	56	28
% Tolerant organisms	22	31
Total Intolerant taxa	1	0
Total Moderate taxa	3	3
Total Facultative taxa	10	8
Total Tolerant taxa	4	5
Total number of taxa	18	16

3.6 Threatened and Endangered Species

3.6.1 Vegetation

Only 2 species of threatened or endangered species of plants (Sheviak 1981) were observed during field surveys (Table 18). They were ginseng (Panax quinquefolius) and goldenseal (Hydrastis canadensis), both state threatened species. Both were found in mesic upland forest habitat near the middle of Transect A (Fig. 5); neither was observed in the proposed right-of-way. Only 5 ginseng plants were found; goldenseal occurred at 3 points as scattered individuals of about 30, 10, and 10 plants.

3.6.2 Amphibians and Reptiles

No threatened or endangered species of amphibians and reptiles are known or expected in the project area (Table 18). Slider, a state endangered species, is potential in the study area. However, it probably no longer occurs in Illinois, and, it is not expected to occur here (Morris and Smith 1981).

3.6.3 Birds

Twenty state threatened or endangered birds (Bowles and Thom 1981) are potential on the study area, i.e., they have been recorded for Alexander County (Table 18). These include 7 known and 13 expected species.

Great egrets were noted on the study area in August; 5 were observed feeding with several cattle egrets and great blue herons along Sexton Creek just east of Rock Island. Great egrets are common migrants and summer residents along the Mississippi River (Graber et al. 1978), and those observed probably represent transient birds.

Table 18. Threatened and endangered species known or potential in the Illinois Route 3 Study Area.

Species	Known	Potential		Status		
		Expected	Not Expected	State Endangered	State Threatened	Federally Endangered
<u>Plants</u>						
Ginseng	X				X	
Goldenseal	X				X	
<u>Amphibians and Reptiles</u>						
Slider			X	X		
<u>Birds</u>						
Double-crested comorant		X		X		
Snowy egret		X		X		
Great egret	X			X		
Little blue heron	X			X		
American bittern		X		X		
Black-crowned night heron		X		X		
Mississippi kite	X			X		
Red-shouldered hawk		X		X		
Bald eagle	X			X		X
Osprey		X		X		
Marsh hawk	X			X		
Common tern		X		X		
Least tern		X		X		
Long-eared owl		X		X		
Short-eared owl		X		X		
Brown creeper		X		X		
Veery		X			X	
Loggerhead shrike	X				X	
Swainson's warbler	X				X	
Brewer's blackbird		X			X	
<u>Mammals</u>						
Gray bat			X	X		X
Indiana bat		X		X		X
Eastern wood rat			X	X		
Golden mouse	X				X	
Rice rat		X			X	
River otter			X		X	
Bobcat		X			X	
<u>Fish</u>						
Alligator gar		X			X	
<u>Mussels</u>						
Fat pocketbook			X			X

Little blue herons were observed in late June in the floodplain north of the levee in Section 1 (Fig. 15) feeding along sloughs and inundated areas of cropland. The species is a common migrant and summer resident in southern Illinois. No nesting colonies were found on the study area; however, George (1968) noted a colony of little blue herons nesting in small cottonwoods along Clear Creek near Gale.

Mississippi kites were observed flying along the Mississippi River in June during driving bird censuses, but no nests were found on the study area. Evans (1981) recorded 2 Mississippi kite nests 0.4 and 3.5 miles (0.6 and 5.6 km) south of Thebes along the Mississippi River in 1981. Aerial searches for kite nests conducted by the Illinois Department of Conservation (IDOC) in 1984 indicated 3 nests were located 0.4, 1.4, and 1.9 miles (0.6, 2.2, and 3.0 km) south of Thebes along the river (M. Sweet, IDOC, pers. commun.).

The bald eagle, a federal endangered species, was subject of a special study (Fink and Jaques 1985) to determine utilization of the study area by the species. From January-March 1984, eagle numbers and activities were identified via ground and aerial surveys. Results indicated utilization of the area was highest in January; at this time, the Mississippi River portion of the study area received the greatest amount of observed use (primarily foraging, feeding, and perching) by eagles. Several perch sites were located along the proposed right-of-way along the Mississippi River and Sexton Creek. Foraging activity was concentrated near the mouth of Sexton Creek and just south of the Thebes railroad bridge on the Missouri side of the river. The floodplain area north of Gale and west of Route 3 served as an important diurnal perching area. Two main flight corridors were observed: (1) along Sexton Creek and (2) across the floodplain from a

point 0.6-1.2 miles (1-2 km) north of the Sexton Creek mouth, west to the river.

Two northern harriers were observed over pastureland and cultivated fields in December during a driving survey. It is a common migrant and winter resident and an occasional summer resident in Illinois (Bohlen 1978). The species is not expected to nest on the study area as nesting habitat (undisturbed marshes, sedge meadows, and wet prairies) is lacking.

Loggerhead shrike is a common permanent resident in southern Illinois (Bohlen 1978). From May to December, shrikes were observed on the study area in Sections 2 and 3 during driving surveys. Appropriate nesting habitat consists of roadside hedges in open country. In southern Illinois, Graber et al. (1973) noted most nests are found in red cedar (Juniperus virginiana) and multiflora rose (Rosa multiflora). Observation of 3 immature shrikes on 29 June evidenced breeding of the species on the study area where pastureland and wooded fencerows provide suitable nesting habitat for the species.

Swainson's warbler is an occasional migrant and a rare summer resident in Alexander County (Bowles and Thom 1981). Nesting in southern Illinois usually occurs in cane (Arundinaria gigantea) thickets of floodplain forests along mud-bottomed streams (Eddleman et al. 1980). On 14 June, a singing male Swainson's was heard during a walking transect survey. The bird may have been unmated as habitat near the mid-point of Transect A (Figs. 2, 5), where the bird was observed, appeared marginal, consisting of upland forest with no cane.

State threatened or endangered species expected on the study area (Table 18) include 1 permanent, 2 summer, and 4 winter residents of Illinois and 5 migrants (Appendix D).

Though not observed during this study, the red-shouldered hawk, a permanent resident, is a potential breeding species on the study area. For nesting, it prefers deciduous lowland forests, especially where there is standing water (Bowles and Thom 1981). Such habitat exists along lower Sexton and Miller creeks.

Black-crowned night heron is an uncommon migrant and summer resident. A variety of nesting sites have been observed for the species, but the proximity of suitable forage habitat, marshes with a good supply of small fish, is important (Graber et al. 1978). The species was not observed on the study area where marshland is lacking.

Breeding colonies of least terns, which prefer undisturbed, unvegetated sandbars for nesting, occur along the Mississippi River in southern Alexander County (Anderson and Woolf 1983). Migrants or postbreeding wanderers are expected along the river portion of the study area, but suitable nesting habitat is not present.

Brown creeper, a common migrant and winter resident and an occasional summer resident, usually occupies floodplain forests and cypress swamps in Illinois (Bowles and Thom 1981). The species may nest on the study area.

Long-eared owl, short-eared owl, and Brewer's blackbird are common to rare winter residents (Bowles and Thom 1981). These and the 5 migrant species may occur seasonally, but are not expected to nest on the study area.

3.6.4 Mammals

Seven state threatened or endangered mammals (Thom 1981), two of which are also classified as federally endangered, have ranges covering the study

area (Table 18). Of these, 1 species is known and 3 species are expected in the study area.

The golden mouse, a state threatened species, is known from the study area; two were captured during small mammal live trapping along Transect D (Fig. 2) about 0.2 and 0.3 mile (0.3 and 0.5 km) southwest of Route 3. There are recent records of the species from Alexander and Union counties (Klimstra 1969). Suitable habitat of the golden mouse in Illinois consists of thickets of catbrier (Smilax spp.) and grape (Vitis spp.) vine entangled in trees, or stands of cane, either along narrow, upland waterways or in floodplains of major streams (Klimstra and Roseberry 1969). In the study area, such habitat, including sites where the species was captured, occurs primarily along Orchard Creek and its tributaries in Section 2.

Indiana bat, rice rat, and bobcat are expected in the study area. The Indiana bat, a federal and state endangered species, hibernates in relatively few caves and mines, primarily in Kentucky and Missouri (Barbour and Davis 1969). During April and mid-May, females leave the hibernacula (Cope and Humphrey 1977) and disperse throughout most of the eastern U.S. (Barbour and Davis 1969). Maternity colonies are established in floodplain woods near suitable foraging habitats, e.g., portions of creeks, riparian vegetation, and forest edges of the floodplain (Humphrey et al. 1977). Little is known about the summer range of male Indiana bats (LaVal et al. 1977). LaVal et al. (1977) observed males foraging mostly under forest canopy on ridges and hillsides, and suggested riparian habitat may be the optimal foraging area. On the study area, apparent suitable foraging habitat occurs along wooded portions of Sexton, Miller, and Orchard creeks and their tributaries and around ponds. The species has been captured 5.0 miles (8.0 km) north of the study area along Ditch 7 near the point where

it enters Clear Creek ditch, a tributary to Sexton Creek, in Union County (Brack 1979). Searches of caves and mines of the Shawnee National Forest by Whitaker (1975) suggested that Indiana bats were apparently absent, or nearly so, from the forest. No collection records of the species were found for Alexander County; however, during summer months, it is expected on the study area.

The rice rat, a state threatened species, prefers marshes and wet meadows along streams, and ditches where grasses and shrubs provide sufficient cover (Schwartz and Schwartz 1959, Barbour and Davies 1974). However, it can live in a variety of natural and disturbed habitats; in Illinois, it has been found along marshy railroad rights-of-way, drainage ditches, and farm ponds (Thom 1981). The species' range in Illinois includes the area south of the Shawnee Hills Section and extends northward along the Mississippi River to Jackson County (Klimstra and Scott 1956). Although no specimens were collected during small mammal live trapping, the study area contains suitable habitats where the species may occur, and there are collection records from Alexander and Union counties (Klimstra and Scott 1956).

Bobcats, a state threatened species, live in several types of habitats, including river bottoms; wooded bluffs and hills with underbrush, interspersed with clearings; and midsuccessional areas with brushy patches (Hoffmeister and Mohr 1957, Schwartz and Schwartz 1959, Barbour and Davis 1974). In Illinois, they are most common in wooded regions of northwestern and southern counties (Thom 1981). There are historical and recent records for the species from numerous locations in Alexander County, including several near Olive Branch (Rhea 1982). On the study area, bobcats are

expected to occur in the wooded hills, and reports of their occurrence were received from local residents during this study.

3.6.5 Fish

No threatened or endangered species of fish were collected in the study area. Alligator gar, a state threatened species, has recently been collected from the unchannelized portion of the Mississippi River at Cairo, Alexander County (Smith 1979), and may occur in the study area (Table 18). It is reportedly widespread in the Gulf States but is rare from Arkansas northward (Smith and Page 1981). Habitat requirements include sluggish backwater pools of large rivers, large swamps, and lakes.

3.6.6 Mussels

No threatened or endangered mussels were collected in the project area. Based on habitat requirements and presence of host fish, fat pocketbook, a federally endangered species, is potential, but not expected, in the study area (Table 18).. There have been no published Upper Mississippi records of live specimens since the Ellis survey during summers of 1930 and 1931 (Fuller 1980). No glochidial host has been recorded but blackstripe topminnow may be a possible host. Fuller (1980) suspects the species has been extirpated from Illinois waterways.

Section 4.0

CONCLUSIONS

4.1 IMPACT ANALYSIS

4.1.1 Vegetation

In general, impacts to plant communities along the construction corridor would result from removal of vegetation, and soil compaction and scarring from construction equipment. Increased light levels and changes in drainage patterns would affect succession in adjoining communities; weedy species would benefit from disturbances.

In Section 1 (Fig. 5), Route 3 would be relocated, for the most part, along railroad beds abandoned by the I.C.G. Railroad. Successional vegetation on the railroad beds and adjacent floodplain vegetation (Fig. 5) would be removed. Eventually, areas along the construction route would be revegetated, and resemble those already present, i.e., a thick tangle of vines, including raccoon grape, summer grape, Virginia creeper, trumpet-creeper, Japanese honeysuckle, and poison ivy. Changes in drainage patterns may occur from road bed construction, but construction on established beds should reduce these impacts. In the southern part of Section 1 (Fig. 5), portions of upland forest, pastureland, and developed land would be removed where the proposed relocation route turns east into the uplands.

In Sections 2 and 3 (Figs. 6, 7), vegetation to be removed consists primarily of upland forest, pastureland, and cropland. Areas of upland forest would be cleared, and adjoining areas would be impacted by construction disturbances. Changes in drainage patterns and associated

changes in soil moisture levels would kill some trees. Increased light levels would kill some plants, especially herbaceous understory. Weedy species, such as grape (Vitis spp.) and Japanese honeysuckle, would increase, eventually dominating edges, especially where grazing or other disturbances have occurred in the woods. Trees with roots injured by grading may die.

Only 2 species of threatened or endangered plants (ginseng and goldenseal) were observed in the study area. The reconstruction project would not impact these species as neither were observed in the proposed right-of-way.

4.1.2 Terrestrial Wildlife

Impacts to terrestrial fauna of the project area would result from construction disturbances and vegetation removal, the latter of which would displace wildlife habitat. Impacts would be greatest in Section 1 (Fig. 2), particularly around North and South ponds and along lower Sexton Creek and the Mississippi River (Fig. 15), where relocation of Route 3 would result in construction disturbances to environs which are generally removed from human activity. Construction would require removal of vegetation along the abandoned I.C.G. Railroad beds and draining of North Pond, thereby displacing resident populations of herpetile, bird, and mammal species.

Along the abandoned railroad beds, common resident herpetiles include eastern box turtle, eastern garter snake, and Fowler's toad. Trees and thickets along the proposed right-of-way provide nesting habitat for indigo bunting, cardinal, blue-gray gnatcatcher, and white-eyed vireo. Resident mammals include deer, fox, squirrels, shrews, and mice.

North Pond provides habitat for herpetiles, including plains leopard frog, southern leopard frog, painted turtle, and red-eared turtle. The pond is seasonally used for resting and feeding by great blue herons and migrating waterfowl such as mallards and wood ducks. Muskrat and beaver are present and raccoon forage along the pond banks.

During low river stages, lower Sexton Creek and the side channel and drainage ditch northeast of Rock Island (Fig. 15) provide feeding and resting areas for wading birds such as great blue herons and great egrets. As previously described in Section 3.6.2, the mouth of Sexton Creek and adjacent portions of the Mississippi River were used by bald eagles for foraging, and several trees along the proposed right-of-way were utilized for perching. Relocation of Route 3 along the river corridor could adversely impact utilization of these areas by these species, but is dependent on the acclimation of each species. Foraging activities of wintering bald eagles would probably be displaced to other nearby portions of the river. However, several trees used by eagles for perching along the river corridor would be removed during construction.

Construction disturbances and vegetation removal would, therefore, directly displace resident wildlife species resulting in a reduction of wildlife populations and species diversity in the immediate areas of construction. Construction would also create noise and activity which would initially reduce the quality of adjacent undisturbed habitats; subsequent disturbances from highway traffic would have a lesser but prolonged effect. It would be expected that more mobile species such as deer, fox, squirrel, and birds would relocate to less disturbed sites at the onset of construction. However, some may not relocate successfully due to a lack of unoccupied habitat. Less mobile species such as herpetiles

and small mammals would experience some mortality along the construction route.

The project would have less effect on terrestrial wildlife along the rest of the reconstruction/relocation route. Reconstruction of Route 3 adjacent to existing pavement in Sections 2 and 3 (Figs. 6, 7) would reduce available habitat through removal of vegetation, including sections of upland forest, pastures, and cultivated fields. Due to the proximity of the existing highway, impacts to terrestrial wildlife would be minimal as species associated with these habitats would be generally tolerant of man's presence and highly adaptable; and, contiguous habitat is available to support most species displaced by the project. Less mobile species would experience some mortality, and others may not relocate successfully due to a lack of unoccupied habitat.

Threatened and endangered animals (federal and state) of known and potential occurrence on the study area and availability of appropriate habitat for them was discussed in Section 3.6. Bald eagle is the only federally listed endangered or threatened species known on the project area; utilization of the area by the species has been documented (Fink and Jaques 1985). Indiana bat, a federal and state endangered species, is expected on the study area. Construction impacts to riparian habitats, suggested as optimal Indiana bat foraging areas, would occur along portions of Sexton Creek and North Pond. However, mist netting for bats in adjacent areas of Miller Creek and South Pond suggested that the area receives little, or no, utilization from bats. Numerous species of birds and mammals, listed as state endangered or threatened, are known or expected in the project area. The project is expected to have little impact on habitat(s) utilized by these species. And, about one-half of the

endangered and threatened birds of the area are transient migratory visitors present in spring and fall, or are winter residents.

4.1.3 Aquatic Biota

Construction impacts to aquatic habitats and biota would generally be short-term impacts related to localized increases in turbidity and suspended solids due primarily to removal of riparian vegetation. Muncy et al. (1979) described impacts of suspended solids and associated turbidity and sedimentation on aquatic communities. These included adverse impacts on reproduction, growth, and development of fish. Vegetation acts as a barrier to runoff, temporarily detaining it and allowing partial absorption into the soil. Long-term impacts include habitat alterations and losses at construction sites. In Section 1 (Fig. 15), proposed realignment of Route 3 includes: (1) construction of a rock pad across Route 3 Pond, (2) replacement of the abandoned I.C.G. Railroad bridge across Sexton Creek with a highway bridge, and (3) draining of North Pond.

Construction of a rock pad and subsequent relocation of the highway across Route 3 Pond would result in a loss of aquatic and riparian habitat to this system. Removal of riparian vegetation and construction activities would result in short-term increases in turbidity and suspended solids which would increase sedimentation that could result in the smothering of bottom-dwelling organisms. Revegetation of disturbed areas after construction would stabilize soil surfaces and allow most suspended solids to be redeposited. Reestablishment of portions of the fish population lost during construction would probably occur through natural reproduction and introductions during seasonal flooding. Some decrease in fish populations is expected due to a loss of aquatic habitat as the highway will cross the

main body of open water. The loss also would result in reduced fishing opportunities for local fishermen who occasionally use the pond.

On Sexton Creek, bridge construction and removal of streamside vegetation would result in localized increases in turbidity and suspended solids. Lower Sexton Creek has an unconsolidated, mud bottom and carries considerable suspended sediment. Increased sediment loading of the creek has the potential to adversely affect existing aquatic biota, either directly by smothering, or indirectly by altering habitats. Increased water turbidity would influence water quality by decreasing dissolved oxygen; organic chemicals adsorbed on soil particles may be transported to and released in the creek influencing conductivity, pH, and alkalinity. These impacts would be of short duration, as disturbed areas would be revegetated or covered by thick riprap to stabilize soil surfaces after construction.

Reconstruction of Route 3 in Sections 2 and 3 (Fig. 2) would result in short-term impacts to tributaries of Miller and Orchard creeks similar to those associated with Sexton Creek. These tributaries are small, intermittent streams with predominantly gravel and sand bottoms. Removal of streamside vegetation and construction of stream overpasses would result in increased turbidity and suspended solids. Increased sedimentation could result in smothering of bottom dwelling organisms, destruction of spawning areas for fish, and reduced habitat diversity for some distance downstream of construction sites. However, reestablishment of macroinvertebrate populations, and subsequently fish populations, probably would occur once streambanks are revegetated and construction ceases. Reconstruction of Route 3, especially construction of stream overpasses, would result in long-term impacts, including habitat alteration and destruction at

construction sites. Grading and road bed construction could result in changes in drainage patterns which may alter stream environments.

Draining of North Pond would result in loss of this aquatic system and its resident fishery resources. The pond supports a fairly healthy fishery, including 7 species of sport fish. It receives some utilization from local fishermen, however, fishing pressure is minimal due to restricted access.

There are no federal or state endangered and threatened species of fish or mussels known in the study area. Alligator gar, considered threatened in Illinois, may potentially be found in the area. Preferred habitat of the species includes sluggish backwater pools of large rivers. It is unlikely that the project would adversely affect the species.

4.2 RECOMMENDATIONS

The following recommendations were formulated to limit potential impacts of the reconstruction/relocation project.

(1) During the construction project, soils would be cleared of their protective vegetative cover and soil surfaces disturbed by equipment and other construction operations. Exposed soil surfaces would be subject to increased erosion, resulting in a loss of topsoil and contributing to stream sediment loads. The hazard of erosion is particularly severe in the Stookey-Bodine soil association, which covers uplands in the central part of the study area (Fig. 4). To control these impacts, an erosion control and revegetation program should be implemented in conjunction with the reconstruction project.

(2) Initiation of construction in early spring (late March) prior to the breeding season may help reduce mortality to terrestrial wildlife as species would be forced to relocate before young are born. Similarly, initiation of construction in mid-summer (mid-July) after the breeding season may help reduce mortality as most young would be of sufficient age and development to relocate successfully.

(3) Construction personnel should be discouraged from killing animals they might encounter. This applies especially to venomous snakes, which are an important part of the fauna and occur in relatively low densities.

(4) Trees along the river corridor used by bald eagles for perching (as identified by Fink and Jaques 1985) and not in the proposed right-of-way should not be disturbed.

Section 5.0

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Section 6.0

APPENDICES

Appendix A

VEGETATION KNOWN IN THE ILLINOIS ROUTE 3 STUDY AREA

Source: E. Ulaszek, Southern Illinois University. Personal observation and collection records. 1984.

Taxonomic Key: Mohlenbrock 1975

Note: Nomenclature follows Mohlenbrock (1975). An asterisk (*) indicates a non-native species. Relative abundance is defined as follows:

Rare - very few individuals present; 1-5 populations observed; preferred habitat rare

Occasional - not many individuals noted, widely spaced; sufficient habitat present

Uncommon - plant occurs throughout study site, often in a variety of habitats

Frequent - often noted in suitable habitat; almost never observed outside of its preferred habitat

Common - often an important plant in a given habitat; rare outside of its preferred habitat

Abundant - a common plant in several habitats; widespread

Ubiquitous - usually a widespread, common plant in most habitats, often weedy

Appendix A. Vegetation known in the Illinois Route 3 Study Area.

Species	Common Name	Relative Abundance	Habitat(s)
EQUISETACEAE			
<u>Equisetum hyemale</u>	Scouring rush	occasional	ditches, riparian habitats
var. <u>affine</u>			
<u>E. arvense</u>	Common horsetail	rare	abandoned roads
OPHIOGLOSSACEAE			
<u>Botrychium dissectum</u>	Graec fern	occasional	open woods
var. <u>obliquum</u>			
<u>B. virginianum</u>	Rattlesnake fern	frequent	open woods
POLYPODIACEAE			
<u>Adiantum pedatum</u>	Maidenhair fern	frequent	mesic woods
<u>Polystichum acrostichoides</u>	Christmas fern	common	woods
<u>Onoclea sensibilis</u>	Sensitive fern	common	moist woods
<u>Thelypteris hexagonoptera</u>	Broad beech fern	occasional	mesic woods
<u>Athyrium pycnocarpon</u>	Glade fern	occasional	mesic ravines
<u>A. filix-femina</u>	Lady fern	rare	mesic rocky woods
var. <u>rubellum</u>			
<u>Asplenium platyneuron</u>	Ebony spleenwort	occasional	dry, open woods; old fields
<u>Woodsia obtusa</u>	Common woodsia	rare	rocky woods
<u>Cystopteris fragilis</u>	Fragile fern	frequent	mesic woods
var. <u>protrusa</u>			
CUPRESSACEAE			
<u>Juniperus virginiana</u>	Red cedar	occasional	hedgerows, old fields, rocky woods
TYPHACEAE			
<u>Typha latifolia</u>	Cattail	rare	ditches, artificial ponds
ALISMACEAE			
<u>Sagittaria latifolia</u>	Common arrowleaf	rare	ditches
POACEAE			
<u>Bromus purgans</u>	Woodland brome grass	occasional	open woods
<u>B. secalinus</u> *	Chess	frequent	old fields, pastures, roadsides
<u>Vulpia octoflora</u>	Six-weeks fescue	occasional	old fields, abandoned roads
<u>Festuca pratensis</u> *	Meadow fescue	common	pastures, roadsides, old fields
<u>F. obtusa</u>	Nodding fescue	occasional	upland woods
<u>Poa pratensis</u> *	Kentucky bluegrass	common	pastures, roadsides, old fields
<u>P. compressa</u> *	Canada bluegrass	common	pastures, roadsides, old fields
<u>P. annua</u> *	Annual bluegrass	occasional	roadsides, moist waste ground
<u>Dactylis glomerata</u> *	Orchard grass	frequent	pastures, roadsides
<u>Sphenopholis obtusata</u>	Wedge grass	occasional	moist woods
<u>Agrostis hyemalis</u>	Tickle grass	occasional	old fields
<u>A. perennans</u>	Upland bent grass	occasional	old fields, open woods
<u>A. alba</u> *	Red top	frequent	old fields, roadsides, pastures
<u>Cinna arundinacea</u>	Short wood reed	occasional	moist woods
<u>Alopecurus carolinianus</u>	Marsh foxtail	occasional	moist ground, roadsides
<u>Phleum pratense</u> *	Timothy	occasional	roadsides, pastures
<u>Elymus hirtellus</u>	Bottlebrush grass	occasional	open woods
<u>E. virginicus</u>	Virginia wild rye	frequent	open woods, old fields
<u>E. villosus</u>	Slender wild rye	occasional	moist woods
<u>Hordeum pusillum</u>	Little barley	frequent	old fields, roadsides, waste ground
<u>Glyceria striata</u>	Fowl-manna grass	occasional	moist ground
<u>Digitaria sanguinalis</u> *	Crabgrass	common	roadsides, pastures, waste ground
<u>D. ischaemum</u> *	Smooth crab grass	occasional	roadsides, waste ground
<u>Paspalum fluitans</u>	Swamp bead grass	rare	floodplain forest
<u>P. pubiflorum</u>	Bead grass	frequent	roadsides
var. <u>glabrum</u>			
<u>P. ciliatifolium</u>	Bead grass	frequent	roadsides, pastures, old fields
<u>Panicum dichotomiflorum</u>	Witch-grass	occasional	old fields, pastures, waste ground
<u>P. capillare</u>	Witch grass	occasional	waste ground, pastures, roadsides
<u>P. anceps</u>	Panic grass	occasional	roadsides, old fields
<u>P. rigidulum</u>	Monro grass	frequent	moist ground, roadsides, ditches
<u>P. microcarpum</u>	Panic grass	occasional	woods
<u>P. lanuginosum</u>	Panic grass	occasional	old fields
<u>P. commutatum</u>	Panic grass	occasional	woods
<u>P. clandestinum</u>	Deer's-tongue grass	occasional	old fields
<u>P. boscii</u>	Panic grass	occasional	upland woods
<u>Echinochloa pungens</u>	Barneyard grass	frequent	ditches, low ground, waste ground
<u>Setaria lutescens</u> *	Yellow foxtail	occasional	roadsides, waste ground
<u>S. viridis</u> *	Green foxtail	occasional	roadsides, waste ground
<u>S. faberii</u> *	Giant foxtail	occasional	roadsides, pastures, waste ground
<u>Erianthus alopecuroides</u>	Plume grass	rare	roadsides, old fields
<u>Sorghum halepense</u> *	Johnson grass	frequent	roadsides, old fields, waste ground
<u>Sorghastrum nutans</u>	Indian-grass	rare	roadsides; open, dry woods
<u>Brachelytrum erectum</u>	False brome-grass	frequent	upland forest; dry to mesic

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
POACEAE cont.			
<u>Andropogon gerardi</u>	Big bluestem	rare	roadsides; open, dry woods
<u>A. virginicus</u>	Broomsedge	frequent	roadsides, pastures, old fields
<u>A. ellipticus</u>	Elliot's broomsedge	rare	old fields
<u>Schizachyrium scoparium</u>	Little bluestem	rare	old fields; open, dry woods
<u>Eragrostis hypnoides</u>	Pony grass	occasional	moist soil
<u>E. ciliensis</u>	Stinking love grass	frequent	roadsides, waste ground
<u>E. pectinacea</u>	Love grass	occasional	roadsides, waste ground
<u>E. spectabilis</u>	Tumble grass	occasional	old fields, pastures
<u>Tridens flavus</u>	Purpletop	common	pastures, roadsides, old fields
<u>Muhlenbergia schreberi</u>	Nimble will	occasional	woods, waste ground
<u>M. sobolifera</u>	Muhly	occasional	woods
<u>M. frondosa</u>	Muhly	occasional	old fields, moist ground
<u>M. racemosa</u>	Muhly	occasional	moist ground
<u>Eleusine indica</u>	Goose grass	frequent	roadsides, waste ground
<u>Aristida oligantha</u>	Three-awn	occasional	roadsides, waste ground
<u>Arundinaria gigantea</u>	Giant cane	occasional	moist woods
<u>Leersia lenticularis</u>	Marsh cutgrass	rare	moist woods, ditches
<u>L. virginica</u>	White cutgrass	occasional	moist woods
<u>Danthonia spicata</u>	Poverty oat grass	rare	old fields, dry woods
<u>Chasmanthium latifolium</u>	Sea oats	rare	mesic woods
CYPERACEAE			
<u>Cyperus aristatus</u>	Sedge	rare	moist soil
<u>C. erythrorhizos</u>	Sedge	occasional	moist soil
<u>C. esculentus</u>	Nut-sedge	frequent	moist soil
<u>Eleocharis macrostachya</u>	Spike rush	occasional	moist soil
<u>E. acicularis</u>	Spike rush	occasional	moist soil
<u>E. obtusa</u>	Spike rush	occasional	moist soil
<u>Scirpus atrovirens</u>	Green bulrush	occasional	moist soil
<u>Carex retroflexa</u>	Sedge	occasional	woods, old fields
<u>C. rosea</u>	Sedge	occasional	woods
<u>C. muhlenbergii</u>	Sedge	occasional	woods, old fields
<u>C. vulpinoidea</u>	Sedge	frequent	moist soil
<u>C. annectens</u>	Sedge	occasional	moist soil
<u>C. normalis</u>	Sedge	occasional	woods, moist ground
<u>C. tenera</u>	Sedge	occasional	wet ground
<u>C. jamesii</u>	Sedge	rare	woods
<u>C. artitecta</u>	Sedge	occasional	dry woods
<u>C. hirsutella</u>	Sedge	occasional	old fields, dry woods
<u>C. granularis</u>	Sedge	rare	wet ground
<u>C. albursina</u>	Sedge	rare	moist woods
<u>C. frankii</u>	Sedge	occasional	moist ground, ditches
<u>C. lacustri</u>	Sedge	occasional	moist ground, ditches
<u>C. hyalinolepis</u>	Sedge	occasional	moist ground, ditches
<u>C. lupulina</u>	Sedge	occasional	moist ground, ditches
ARACEAE			
<u>Arisaema triphyllum</u>	Jack-in-the-pulpit	frequent	mesic woods
<u>A. dracontium</u>	Green dragon	occasional	moist woods
LEMNACEAE			
<u>Spirodela polyrhiza</u>	Duckweed	occasional	ditches, ponds
<u>Lemna minor</u>	Duckweed	common	ditches, ponds
COMMELINACEAE			
<u>Tradescantia subaspera</u>	Spiderwort	occasional	woods
<u>T. virginiana</u>	Spiderwort	occasional	dry woods
<u>Commelina communis</u>	Dayflower	occasional	waste ground
<u>C. virginica</u>	Dayflower	rare	moist woods, floodplains
JUNCACEAE			
<u>Luzula multiflora</u>	Wood rush	occasional	dry woods
<u>Juncus effusus</u> var. <u>solutus</u>	Soft rush	occasional	ditches
<u>J. biflorus</u>	Rush	rare	old field
<u>J. tenuis</u>	Path rush	occasional	waste ground, roadsides
LILIACEAE			
<u>Hemerocallis fulva</u>	Day lily	frequent	roadsides
<u>Ornithogalum umbellatum</u>	Star-of-Bethlehem	occasional	roadsides, waste ground
<u>Erythronium americanum</u>	Yellow trout-lily	rare	mesic woodlands
<u>Uvularia grandiflora</u>	Yellow bellwort	occasional	mesic-dry woods
<u>Polygonatum commutatum</u>	Solomon's seal	occasional	woods
<u>Smilacina racemosa</u>	False Solomon's seal	frequent	woods

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
LILIACEAE cont.			
<u>Asparagus officinalis*</u>	Asparagus	frequent	roadsides, old fields
<u>Allium canadense</u>	Wild onion	occasional	moist woods
<u>A. vineale*</u>	Field garlic	common	roadsides, waste ground, old fields, woods
<u>Trillium recurvatum</u>	Wake robin	frequent	mesic woods
<u>Yucca filamentosa*</u>	Yucca	rare	roadsides, waste ground
var. <u>smalliana</u>			
<u>Narcissus pseudo-narcissus*</u>	Daffodil	occasional	abandoned homesites, roadsides
SMILACEAE			
<u>Smilax glauca</u>	Catbrier	common	dry woods
<u>S. bono-nox</u>	Catbrier	rare	dry woods, old fields
<u>S. rotundifolia</u>	Greenbrier	frequent	moist woods
<u>S. hispida</u>	Catbrier	rare	moist woods
<u>S. lasioneura</u>	Carrian flower	occasional	woods, old fields
DIOSCOREACEAE			
<u>D. villosa</u>	Wild yam	occasional	dry woodlands
<u>D. quaternata</u>	Wild yam	frequent	woodlands
IRIDACEAE			
<u>Sisyrinchium albidum</u>	Blue-eyed grass	occasional	open woods
ORCHIDACEAE			
<u>Aplectrum hyemale</u>	Putty-root	occasional	moist-mesic woods
<u>Spiranthes cernua</u>	Nodding lady's-tresses	occasional	old fields
SAURURACEAE			
<u>Saururus cernuus</u>	Lizard's-tail	frequent	floodplain woods
SALICACEAE			
<u>Salix nigra</u>	Black willow	common	floodplain woods
<u>S. interior</u>	Sandbar willow	occasional	ditches
<u>Populus deltoides</u>	Cottonwood	common	floodplains
JUGLANDACEAE			
<u>Juglans nigra</u>	Black walnut	occasional	dry-moist woods
<u>Carya illinoensis</u>	Pecan		bottomland woods
<u>C. cordiformis</u>	Bitternut hickory	occasional	dry & mesic woods
<u>C. texana</u>	Black hickory	uncommon	dry woods
<u>C. ovalis</u>	Red hickory	frequent	dry-mesic woods
<u>C. glabra</u>	Pignut hickory	common	dry woodlands
<u>C. tomentosa</u>	Mockernut hickory	occasional	dry woodlands
<u>C. ovata</u>	Shagbark hickory	frequent	woods
<u>C. latifolia</u>	Kingnut hickory	rare	well-drained bottomland woods
BETULACEAE			
<u>Betula nigra</u>	River birch	uncommon	riparian habitats, old fields
<u>Corylus americana</u>	American hazelnut	frequent	woods
<u>Ostrya virginiana</u>	Hop hornbeam	common	dry woods
<u>Carpinus caroliniana</u>	American hornbeam	occasional	mesic woods
FAGACEAE			
<u>Fagus grandifolia</u>	American beech	frequent	dry to mesic woods
<u>Quercus imbricaria</u>	Shingle oak	occasional	dry woods, old fields
<u>Q. falcata</u>	Southern red oak	occasional	dry-mesic woods
<u>Q. velutina</u>	Black oak	common	dry woods
<u>Q. rubra</u>	Red oak	frequent	mesic woods
<u>Q. palustris</u>	Pin oak	occasional	bottomland woods
<u>Q. shumardii</u>	Shumard's oak	rare	well drained bottomland woods
<u>Q. coccinea</u>	Scarlet oak	occasional	dry woods
<u>Q. muhlenbergii</u>	Yellow chestnut oak	occasional	dry-mesic woods
<u>Q. alba</u>	White oak	common	dry-mesic woods
<u>Q. stellata</u>	Post oak	occasional	dry, south facing slopes
<u>Q. macrocarpa</u>	Bur oak	rare	well drained, bottomland woods
ULMACEAE			
<u>Ulmus rubra</u>	Slippery elm	common	woods, old fields
<u>U. americana</u>	American elm	frequent	mesic woods, edges, riparian situations
<u>U. alata</u>	Winged elm	occasional	dry woods, old fields
<u>Celtis occidentalis</u>	Eastern hackberry	frequent	woods
<u>C. laevigata</u>	Sugarberry	frequent	mesic woods, bottomlands
<u>C. tenuifolia</u>	Dwarf hackberry	rare	dry woods

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
MORACEAE			
<u>Morus alba*</u>	White mulberry	frequent	waste ground
<u>M. rubra</u>	Red mulberry	frequent	dry-mesic to mesic woods
URTICACEAE			
<u>Boehmeria cylindrica</u>	False nettle	occasional	mesic woods, moist pasture
<u>Laportea canadensis</u>	Wood-nettle (stinging nettle)	local, common	mesic woods, wet-mesic forest
<u>Pilea pumila</u>	Clearweed	local, common	mesic ravines
<u>Parietaria pennsylvanica</u>	Pellitory	occasional	mesic woods, waste ground
LORANTHACEAE			
<u>Phoradendron flavescens</u>	Mistletoe	rare	parasitic of trees in floodplain forest
ARISTOLCHIACEAE			
<u>Asarum canadense</u>	Wild cinque	local, common	mesic forest
<u>var. reflexum</u>			
<u>Aristolochia serpentina</u>	Virginia snakeroot	rare	dry-mesic forest
POLYGONACEAE			
<u>Rumex acetosella*</u>	Sour dock	occasional	waste ground, old fields, pastures
<u>R. obtusifolius*</u>	Bitter dock	occasional	waste ground
<u>R. crispus*</u>	Curly dock	occasional	roadsides, pastures, waste ground, old fields
<u>R. verticillatus</u>	Swamp dock	occasional	open, wet ground in floodplain; roadside ditches
<u>Polygonum scandens</u>	False buckwheat	frequent	waste ground, old fields, abandoned railroad beds
<u>P. aviculare*</u>	Knotweed	common	waste ground, roadsides, abandoned railroad beds
<u>P. virginianum</u>	Woodland knotweed	frequent	dry-mesic to mesic forest
<u>P. setaceum</u>	Smartweed	occasional	wet ground, roadside ditches
<u>P. punctatum</u>	Smartweed	occasional	moist ground, roadside ditches
<u>P. persicaria*</u>	Lady's thumb	occasional	moist cropland, roadside ditches
<u>P. lapathifolium*</u>	Smartweed	occasional	open bottomlands, moist cropland
<u>P. pensylvanicum</u>	Common smartweed	occasional	wet cropland, roadsides
CHENOPODIACEAE			
<u>Chenopodium album</u>	Lamb's-quarter	occasional	waste ground, cropland
AMARANTHACEAE			
<u>Amaranthus retroflexus*</u>	Pigweed	loc. common	waste ground, cropland
<u>A. tamariscina</u>	Water hemp	rare	moist ground, roadside ditches
<u>Frølichia gracilis*</u>	Cottonweed	common	abandoned railroad beds
PHYTOLACCACEAE			
<u>Phytolacca americana</u>	Pokeweed	frequent	woods, old fields, waste ground
AIZOACEAE			
<u>Mollugo verticillatus*</u>	Carpetweed	uncommon	abandoned railroad beds, croplands
PORTULACACEAE			
<u>Portulaca oleracea*</u>	Purslane	occasional	waste ground
<u>Claytonia virginica</u>	Spring beauty	common	dry-mesic to mesic woods
CARYOPHYLLACEAE			
<u>Stellaria media*</u>	Common chickweed	occasional	waste ground, cropland
<u>Cerastium vulgatum*</u>	Mouse-ear chickweed	occasional	waste ground, pastures
<u>Dianthus armeria*</u>	Deptford pink	common	roadsides, pasture, old fields, abandoned railroad beds
<u>Silene stellata</u>	Starry campion	occasional	dry forest
<u>S. antirrhina*</u>	Sleepy catchfly	occasional	abandoned railroad beds
<u>Saponaria officinalis*</u>	Bouncing bet	occasional	abandoned railroad beds, roadsides
CERATOPHYLLACEAE			
<u>Ceratophyllum demersum</u>	Coontail	occasional	man-made ponds
RANUNCULACEAE			
<u>Ranunculus abortivus</u>	Crowfoot	frequent	woods
<u>R. scardous*</u>	Buttercup	abundant	wet ground, pastures
<u>R. recurvatus</u>	Buttercup	uncommon	woods
<u>Actaea pachypoda</u>	Doll's eyes	uncommon	mesic woods
<u>Hydrastis canadensis</u>	Goldenseal	rare	mesic woods
<u>Isopyrum bitermum</u>	False rue anemone	rare	mesic woods

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
RANUNCULACEAE			
<u>Anemone virginiana</u>	Tall anemone	occasional	dry woods, edges, old fields
<u>Clematis virginiana</u>	Virgin's bower	occasional	dry woods
BERBERIDACEAE			
<u>Podophyllum peltatum</u>	May apple	local, common	dry-mesic to mesic woods
MENISPERMACEAE			
<u>Calyocarpus lyonii</u>	Cupseed	rare	floodplain forest
<u>Menispermum canadense</u>	Moonseed	occasional	mesic to floodplain forest
MAGNOLIACEAE			
<u>Magnolia acuminata</u>	Cucumber magnolia	uncommon	mesic forest
<u>Liriodendron tulipifera</u>	Tulip-poplar	common	woods, old fields
ANNONACEAE			
<u>Asimina triloba</u>	Pawpaw	common, local, abundant	mesic woods
LAURACEAE			
<u>Sassafras albidum</u>	Sassafras	abundant	dry to dry-mesic woods, old fields
<u>Lindera benzoin</u>	Spicebush	loc. common	mesic forest, wet-mesic floodplain forest
PAPAVERACEAE			
<u>Sanguinaria canadensis</u>	Bloodroot	frequent	mesic woods
<u>Dicentra cucullaria</u>	Dutchman's breeches	frequent	dry-mesic to mesic woods
<u>D. canadensis</u>	Squirrel corn	rare	mesic ravines
<u>Corydalis flavula</u>	Pale corydalis	occasional	mesic woods, floodplain woods
CRUCIFERAE			
<u>Dentaria laciniata</u>	Toothwort	loc. common	dry-mesic woods
<u>Capsella bursa-pastoris*</u>	Shepard's purse	frequent	waste ground
<u>Arabis laevigata</u>	Smooth rockcress	occasional	rocky mesic woods
<u>Lepidium virginicum</u>	Common peppergrass	frequent	waste ground, roadsides, old fields
<u>Thlaspi arvense*</u>	Penny-cress	occasional	cropland, roadsides
<u>Barbarea vulgaris*</u>	Yellow rocket	occasional	cropland, roadsides
<u>Brassica rapa*</u>	Field mustard	rare	roadsides
<u>Rorippa islandica</u>	Marsh yellow cress	occasional	wet ground, roadside ditches
SAXIFRAGACEAE			
<u>Hydrangea arborescens</u>	Wild hydrangea	frequent	mesic forest, ravines
<u>Heuchera hirsuticaulis</u>	Tall alumroot	occasional	dry-mesic woods
<u>Pethorum sedoides</u>	Ditch stonecrop	occasional	roadside ditches, open bottomland
HAMAMELIDACEAE			
<u>Liquidambar styraciflua</u>	Sweetgum	loc. common	mesic woods, mesic-wet floodplain, old fields
PLATANACEAE			
<u>Platanus occidentalis</u>	Eastern sycamore	common	floodplain forests, riparian situations, moist old fields
ROSACEAE			
<u>Prunus serotina</u>	Black cherry	occasional	mesic woods, old fields
<u>P. americana</u>	Wild plum	occasional	old fields, thickets
<u>P. angustifolia</u>	Chickasaw plum	occasional	old fields, roadsides
<u>Amelanchier arborea</u>	Shadbush	occasional	dry forest
<u>Malus coronaria</u>	Wild sweet crabapple	rare	old fields
<u>Crataegus pruinosa</u>	Hawthorn	rare	old fields, open dry woods
<u>C. viridis</u>	Green hawthorn	occasional	floodplain forest
<u>Rubus occidentalis</u>	Black raspberry	rare	old fields, thickets
<u>R. trivialis*</u>	Southern dewberry	occasional	old fields, abandoned railroad bed
<u>R. allegheniensis</u>	Wild blackberry	common	old fields, dry woods, edges, etc.
<u>Rosa multiflora*</u>	Multiflora rose	common	old fields, fencerows, pastures
<u>R. setigera</u>	Summer rose	occasional	old fields, edges
<u>R. carolina</u>	Pasture rose	occasional	dry woods
<u>Potentilla simplex</u>	Creeping cinquefoil	frequent	dry woods, old fields
<u>P. recta*</u>	Sulfurous cinquefoil	occasional	pastures, roadsides
<u>P. norvegica*</u>	Annual cinquefoil	rare	waste ground
<u>Fragaria virginiana</u>	Wild strawberry	rare	old fields
<u>Aruncus dioicus</u>	Goat's-beard	rare	rocky mesic woods
<u>Geum canadense</u>	White avens	frequent	dry and dry-mesic forests, edges
<u>Agrimonia rostellata</u>	Agrimony	frequent	woods, thickets
<u>A. parviflora</u>	Agrimony	occasional	mesic wet floodplain

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
LEGUMINOSAE			
<u>Cercis canadensis</u>	Redbud	frequent	dry woods
<u>Gymnocladus dioica</u>	Kentucky coffee-tree	occasional	riparian situations, mesic forests
<u>Gleditsia triacanthos</u>	Honey locust	frequent	bottomland forests, fencerows, old fields
<u>G. aquatica</u>	Water locust	rare	bottomland forest
<u>Desmanthus illinoensis</u>	Illinois mimosa	occasional (near Thebes)	roadsides, old fields
<u>Albizia julibrissin</u> *	Silk-tree	rare (near Thebes)	waste ground
<u>Wisteria macrostachya</u>	Kentucky wisteria	rare	edge of floodplain woods
<u>Amorpha fruticosa</u>	False indigo	rare	riparian situations
<u>Robinia pseudoacacia</u>	Black locust	frequent	disturbed woods, old fields
<u>Crotalaria sagittalis</u>	Rattlebox	occasional	old fields, abandoned railroad beds
<u>Cassia fasciculata</u>	Partridge pea	common	old fields, roadsides, pastures, abandoned railroad beds
<u>C. nictitans</u>	Wild sensitive plant	frequent	old fields, dry woods, abandoned railroad beds
<u>C. marilandica</u>	Wild senna	rare	riparian situations, old fields
<u>Apios americana</u>	Groundnut	occasional	open bottomlands, moist thickets, riparian situations
<u>Coronilla varia</u> *	Crownvetch	rare	roadsides
<u>Tephrosia virginiana</u>	Goat's-rue	rare	dry woods
<u>Medicago officinalis</u> *	Yellow sweet clover	abundant	roadsides, pastures, abandoned railroad beds
<u>M. alba</u> *	White sweet clover	frequent	roadsides, abandoned railroad beds
<u>Trifolium pratense</u> *	Red clover	frequent	pastures, old fields, roadsides
<u>T. repens</u> *	White clover	common	pasture, roadsides
<u>T. hybridum</u> *	Alsike clover	occasional	roadsides
<u>Medicago sativa</u> *	Alfalfa	rare	roadsides
<u>M. lupulina</u> *	Black medic	occasional	pastures, roadsides, old fields
<u>Lespedeza striata</u> *	Japanese lespedeza	frequent	roadsides, pastures
<u>L. stipulacea</u> *	Korean bush clover	frequent	roadsides, pastures
<u>L. repens</u>	Creeping bush clover	occasional	dry woods
<u>L. hirta</u>	Hairy bush clover	rare	dry woods
<u>L. cuneata</u> *	Sericea	frequent	roadsides, old fields
<u>L. violacea</u>	Violet bush clover	occasional	dry woods
<u>L. virginica</u>	Slender bush clover	occasional	old fields
<u>Desmodium nudiflorum</u>	Bare-stemmed tick-trefoil	frequent	dry-mesic forests
<u>D. glutinosum</u>	Pointed tick-trefoil	occasional	mesic woods
<u>D. sessilifolium</u>	Prairie tick-trefoil	rare	old fields
<u>D. cuspidatum</u>	Tick-trefoil	occasional	dry woods
<u>D. canescens</u>	Hoary tick-trefoil	rare	old fields
<u>D. paniculatum</u>	Panicled tick-trefoil	frequent	old fields, roadsides
<u>Amphicarpa bracteata</u>	Hog peanut	occasional	dry woods, dry-mesic woods
<u>Strophostyles helvola</u>	Wild bean	occasional	roadside ditches
OXALIDACEAE			
<u>Oxalis violacea</u>	Purple wood-sorrel	occasional	dry woods
<u>O. dillenii</u>	Yellow wood-sorrel	frequent	roadsides, waste ground
<u>O. stricta</u>	Yellow wood-sorrel	common	dry woods, waste ground
GERANIACEAE			
<u>Geranium maculatum</u>	Wild geranium	occasional	mesic forest
<u>G. carolinianum</u>	Wild cranesbill	occasional	old fields, abandoned railroad bed
SIMARUBACEAE			
<u>Ailanthus altissima</u> *	Tree-of-heaven	loc. common (near Thebes)	waste ground
POLYGALACEAE			
<u>Polygala sanguinea</u>	Field milkwort	occasional	moist old field
EUPHORBIACEAE			
<u>Croton monanthogynus</u>	Wild croton	occasional	roadsides, abandoned railroad beds
<u>Acalypha rhomboidea</u>	Three-sided mercury	frequent	dry-mesic woods, edges, waste ground
<u>A. graciliens</u>	Three-sided mercury	common	dry woods, old fields, edges
<u>A. virginica</u>	Three-sided mercury	frequent	dry woods, old fields, roadsides
<u>Euphorbia corollata</u>	Flowering spurge	occasional	pastures, old fields, open dry woods
<u>Poinsettia dentata</u>	Wild poinsettia	occasional	roadsides, abandoned railroad beds, old fields, pastures
<u>Chamaesyce supina</u>	Milk spurge	occasional	roadsides, waste ground
<u>C. maculata</u> *	Nodding spurge	common	roadsides, waste ground

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
ANACARDIACEAE			
<u>Toxicodendron radicans</u>	Poison ivy	ubiquitous	woods, old fields, waste ground
<u>Rhus copallina</u>	Shining sumac	frequent	old fields, edges, roadsides
<u>R. glabra</u>	Smooth sumac	common	old fields, waste ground, disturbed woods, railroad beds
<u>R. aromatica</u>	Fragrant sumac	occasional	dry woods
AQUIFOLIACEAE			
<u>Ilex decidua</u>	Possum haw	occasional	open woods, floodplain forests
CELASTRACEAE			
<u>Euonymus atropurpureus</u>	Wahoo	occasional	mesic woods
<u>Celastrus scandens</u>	American bittersweet	occasional	woods, edges, fencerows
STAPHYLEACEAE			
<u>Stachylea trifolia</u>	Bladdernut	rare	mesic woods
ACERACEAE			
<u>Acer negundo</u>	Box elder	frequent	floodplain forests, edges, waste ground, old fields
<u>A. saccharum</u>	Sugar maple	frequent	dry-mesic and mesic forest
<u>A. saccharinum</u>	Silver maple	common	wet floodplain forest
<u>A. rubrum</u>	Red maple	rare	dry and dry-mesic forest
HIPPOCASTANACEAE			
<u>Aesculus discolor</u>	Red buckeye	occasional	mesic woods, edges
BALSAMINACEAE			
<u>Impatiens biflora</u>	Orange touch-me-not	frequent	mesic woods, ravines, riparian situations
<u>I. pallida</u>	Yellow touch-me-not	rare	mesic woods
RHAMNACEAE			
<u>Ceanothus americanus</u>	New Jersey tea	occasional	dry woods
<u>Rhamnus caroliniana</u>	Indian cherry	rare	dry woods
VITACEAE			
<u>Parthenocissus quinquefolia</u>	Virginia creeper	abundant	woods, thickets
<u>Amoelopsis cordata</u>	Raccoon grape	frequent	waste ground, roadsides, abandoned railroad beds, open floodplains
<u>A. arborea</u>	Pepper vine	uncommon	floodplain forests
<u>Vitis aestivalis</u>	Summer grape	common	woods, thickets, fencerows
<u>V. cinerea</u>	Winter grape	occasional	upland woods, old fields
<u>V. vulpina</u>	Frost grape	occasional	upland woods
<u>V. palmata</u>	Swamp grape	occasional	floodplain forests
TILIACEAE			
<u>Tilia americana</u>	Basswood	rare	mesic forest
MALVACEAE			
<u>Hibiscus lasiocarpus</u>	Swamp rose mallow	occasional	open floodplains
<u>H. trionum</u> *	Flower-of-the-hour	occasional	cultivated fields
<u>Abutilon theophrasti</u> *	Velvet leaf	frequent	cultivated fields
<u>Sida spinosa</u>	Prickly sida	occasional	roadsides, waste ground
HYPERICACEAE			
<u>Ascyrum hypericoides</u>	St. Andrew's cross	occasional	dry woods
<u>Hypericum perforatum</u> *	Common St. John's-wort	occasional	roadsides, pastures
<u>H. punctatum</u>	Spotted St. John's-wort	occasional	old fields
<u>H. spathulatum</u>	Shrubby St. John's-wort	occasional	old fields
<u>H. mutilum</u>	Dwarf St. John's-wort	uncommon	moist open ground
<u>Triadenum tubulosum</u>	Marsh St. John's-wort	rare	open wet ground; floodplains
VIOLACEAE			
<u>Viola sororia</u>	Blue violet	common	woods
<u>V. triloba</u>	Cleft violet	frequent	dry woods
<u>V. pubescens</u>	Yellow violet	frequent	dry woods
<u>var. eriocarpa</u>			
<u>V. striata</u>	Cream violet	occasional	wet-mesic woods
<u>V. rafinesquii</u> *	Wild pansy	occasional	waste ground
PASSIFLORACEAE			
<u>Passiflora lutea</u>	Small passion-flower	occasional	dry woods
<u>P. incarnata</u>	Maypops	rare	abandoned railroad beds

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
ELEAGNACEAE			
<u>Eleagnus umbellata</u> *	Autumn-olive	rare	old fields
LYTHRACEAE			
<u>Ammannia coccinea</u>	Red loosestrife	occasional	shorelines; wet ground
<u>Kotala racemosa</u>	Tooth-cup	occasional	shorelines; wet ground
NYSSACEAE			
<u>Nyssa aquatica</u>	Sour gum	occasional	dry-mesic woods
ONAGRACEAE			
<u>Circaea quadrisuleata</u>	Enchanter's nightshade	occasional	upland woods
var. <u>canadensis</u>			
<u>Ludwigia alternifolia</u>	Seedbox	occasional	moist open ground
<u>Jussiaea repens</u>	Creeping primrose willow	occasional	edges of floodplain pond
var. <u>glabrescens</u>			
<u>Oenothera speciosa</u> *	Showy evening primrose	rare	roadsides
<u>O. lacinata</u>	Ragged evening primrose	occasional	cultivated fields, roadsides
<u>O. biennis</u>	Evening primrose	frequent	old fields, roadsides, waste ground
ARALIACEAE			
<u>Aralia spinosa</u>	Devil's walking-stick	frequent	dry-mesic woods
<u>Panax quinquefolius</u>	Ginseng	rare	mesic woods
UMBELLIFERAE			
<u>Thaspium trifoliatum</u>	Meadow parsnip	occasional	dry-mesic and dry forests
<u>Sanicula canadensis</u>	Black snakeroot	occasional	upland woods
<u>S. gregaria</u>	Black snakeroot	occasional	upland woods
<u>Torilis japonica</u> *	Hedge parsley	occasional	waste ground, abandoned railroad beds
<u>Daucus carota</u> *	Wild carrot	occasional	roadsides, old fields
<u>Circuta maculata</u>	Water hemlock	rare	roadside ditches
CORNACEAE			
<u>Cornus florida</u>	Flowering dogwood	common	dry-mesic to dry forests; old fields
<u>C. drummondii</u>	Rough-leaved dogwood	occasional	old fields, dry woods
<u>C. foemina</u>	Stiff dogwood	uncommon	thickets, riparian situations, floodplain forests
ERICACEAE			
<u>Vaccinium arboreum</u>	Huckleberry	rare	dry, open forests
<u>V. vacillans</u>	Low-bush blueberry	occasional	dry forests
PRIMULACEAE			
<u>Dodecatheon meadia</u>	Shooting star	occasional	dry forest
<u>Lysimachia ciliata</u>	Fringed loosestrife	occasional	mesic woods, mesic-wet floodplain forest
EBENACEAE			
<u>Diospyros virginiana</u>	Common persimmon	common	dry woods, old fields, fencerows
OLEACEAE			
<u>Fraxinus pennsylvanica</u>	Green ash	frequent	floodplain forest
var. <u>subintegerrima</u>			
<u>F. americana</u>	White ash	common	dry-mesic forest, old fields
<u>Forestiera acuminata</u>	Swamp privet	frequent	wet floodplain forest
GENTIANACEAE			
<u>Swertia carolinensis</u>	American columbo	occasional	dry-mesic forests
<u>Sabatia angularis</u>	Marsh-pink	rare	old fields
APOCYNACEAE			
<u>Amsonia tabernaemontana</u>	Blue star	rare	dry woods
<u>Apocynum cannabinum</u>	Wild dogbane	frequent	old fields, roadsides
ASCLEPIADACEAE			
<u>Asclepias syriaca</u>	Common milkweed	common	pastures, roadsides, old fields
<u>A. tuberosa</u>	Butterflyweed	frequent	pastures, old fields
<u>A. incarnata</u>	Swamp milkweed	occasional	roadside ditches; wet, open floodplains
<u>A. variegata</u>	White milkweed	rare	dry woods
CONVOLVULACEAE			
<u>Convolvulus arvensis</u> *	Field bindweed	uncommon	waste ground, roadsides

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
CONVOLVULACEAE cont.			
<u>Calyotegia sepium</u>	Climbing bindweed	uncommon	old fields, waste ground
<u>Ipomoea pandurata</u>	Wild sweet potato	occasional	waste ground, roadsides
<u>I. lacunosa</u>	Small white morning-glory	occasional	roadsides, open floodplains
<u>I. hederacea *</u>	Ivy-leaved morning-glory	frequent	cultivated fields, waste ground
<u>Cuscuta gronovii</u>	Dodder	occasional	roadsides, wet ground, thickets
POLEMONIACEAE			
<u>Polemonium reptans</u>	Jacob's-ladder	occasional	mesic woods
<u>Phlox divaricata</u>	Blue phlox	frequent	mesic woods
<u>P. paniculata</u>	Tall phlox	uncommon	mesic woods, floodplains, riparian situations
HYDROPHYLLACEAE			
<u>Hydrophyllum appendiculatum</u>	Waterleaf	uncommon	mesic woods
<u>Phacelia bipinnatifida</u>	Waterleaf	occasional	mesic woods
BORAGINACEAE			
<u>Heliotropium indicum *</u>	Indian heliotrope	occasional	open floodplains
<u>Cynoglossum virginianum</u>	Wild comfrey	occasional	dry forests
<u>Myosotis virginica</u>	Scorpion grass	occasional	old fields, etc.
<u>Lithospermum arvense *</u>	Gromwell	uncommon	roadsides
VERBENACEAE			
<u>Lippia lanceolata</u>	Frog-fruit	frequent	open, moist ground
<u>Verbena urticifolia</u>	White vervain	occasional	old fields, disturbed woods
<u>V. bracteata *</u>	Creeping vervain	rare	roadsides
<u>V. hastata</u>	Blue vervain	rare	roadside ditches
PHYRMACEAE			
<u>Phryma leptosachya</u>	Lopseed	occasional	dry-mesic woods
LABIATAE			
<u>Lycopus americanus</u>	Water horehound	occasional	roadside ditches, open floodplains
<u>L. rubellus</u>	Water horehound	frequent	roadside ditches, open floodplains, pond edges
<u>Teucrium canadense</u>	American germander	occasional	old fields, abandoned railroad beds
<u>Scutellaria nervosa</u>	Veiny skullcap	rare	dry-mesic floodplain forests
<u>Conium origanoides</u>	Dittany	frequent	dry forest
<u>Monarda fistulosa</u>	Wild bergamot	occasional	old fields
<u>M. bradburiana</u>	Bergamot	occasional	dry woods
<u>Collinsonia canadensis</u>	Richweed	rare	mesic woods
<u>Hedeoma pulegioides</u>	American pennyroyal	occasional	roadsides, abandoned railroad beds
<u>Pycnanthemum tenuifolium</u>	Slender mountain mint	frequent	old fields
<u>Lamium amplexicaule *</u>	Henbit	frequent	pastures, roadsides
<u>L. purpureum *</u>	Purple dead nettle	uncommon	pastures, roadsides
<u>Perilla frutescens *</u>	Beefsteak plant	loc. common	abandoned railroad beds, roadsides
<u>Trichostema dichotomum</u>	Blue curls	rare	abandoned railroad beds
SOLANACEAE			
<u>Solanum carolinense</u>	Horse-nettle	occasional	pastures, old fields, waste ground
<u>S. americanum</u>	Black nightshade	frequent	cultivated fields
<u>Datura stramonium *</u>	Jimsonweed	occasional	cultivated fields, waste ground
<u>Physalis virginiana</u>	Ground cherry	rare	dry, disturbed woods
SCROPHULARIACEAE			
<u>Veronicastrum virginicum</u>	Culver-root	rare	woods
<u>Penstemon digitalis</u>	Foxglove beard-tongue	rare	open, dry-mesic woods
<u>P. pallidus</u>	Pale beard-tongue	rare	dry woods
<u>Gerardia tenuifolia</u>	Slender false-foxglove	occasional	old fields
<u>Mimulus alatus</u>	Monkey flower	occasional	open floodplains, riparian situations
<u>Verbascum thapsus</u>	Woolly mullein	frequent	old fields, roadsides, pastures, abandoned railroad beds
<u>V. blattaria *</u>	Moth mullein	occasional	roadsides, abandoned railroad beds
<u>Chaenorrhinum minus*</u>	Dwarf snapdragon	uncommon	abandoned railroad beds
BIGNONIACEAE			
<u>Campsis radicans</u>	Trumpet creeper	common	old fields, fencerows, woods, edges, thickets
<u>Catalpa speciosa *</u>	Northern catalpa	rare	roadsides, disturbed woods
ACANTHACEAE			
<u>Justicia americana</u>	Water willow	rare	ponds, shorelines, riparian situations

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
ACANTHACEAE cont.			
<u>Ruellia humilis</u>	Wild petunia	occasional	dry woods, abandoned railroad beds
<u>R. strepens</u>	Smooth ruellia	occasional	upland woods
PLANTAGINACEAE			
<u>Plantago aristata</u>	Bracted plantain	loc. common	abandoned railroad beds, roadsides
<u>P. lanceolata*</u>	Buckhorn	common	old fields, pastures, roadsides, waste ground
<u>P. rugelii</u>	Common plantain	common	pastures, roadsides, waste ground
RUBIACEAE			
<u>Cephalanthus occidentalis</u>	Buttonbush	frequent	shorelines, open bottomlands
<u>Galium aparine</u>	Bedstraw	occasional	disturbed woods, mesic forests
<u>G. circaeazans</u>	Wild licorice	frequent	upland woods
<u>G. triflorum</u>	Bedstraw	occasional	mesic woods, wet-mesic floodplain forests
<u>G. concinnum</u>	Bedstraw	uncommon	mesic woods
<u>G. obtusum</u>	Bedstraw	uncommon	disturbed
<u>Diodia teres</u>	Rough buttonweed	loc. common	pastures, roadsides, abandoned railroad beds
<u>D. virginiana*</u>	Large buttonweed	occasional	roadside ditches
<u>Spermocoe glabra</u>	Smooth buttonweed	uncommon	open bottomlands
<u>Houstonia purpurea</u>	Bluets	rare	dry woods
CAPRIFOLIACEAE			
<u>Sambucus canadensis</u>	Elderberry	frequent	old fields, open woods, fencerows
<u>Lonicera japonica*</u>	Japanese honeysuckle	loc. abundant	old fields, woods, thickets
<u>Symphoricarpos orbiculatus</u>	Coralberry	occasional	dry woods, old fields
<u>Viburnum rufidulum</u>	Southern blackhaw	occasional	upland woods
<u>Triosteum perfoliatum</u>	Horse gentian	occasional	mesic and dry-mesic woods
VALERIANACEAE			
<u>Valerianella radiata</u>	Corn salad	rare	abandoned railroad beds
CAMPANULACEAE			
<u>Specularia perfoliata</u>	Venus' looking glass	uncommon	disturbed woods
<u>Campanula americana</u>	American bellflower	occasional	mesic woods, edges
<u>Lobelia inflata</u>	Indian tobacco	occasional	thickets, roadsides
<u>L. siphilitica</u>	Great blue lobelia	rare	riparian situations, open floodplains
COMPOSITAE			
<u>Polymnia canadensis</u>	Leafcup	uncommon	upland woods
<u>Silphium perfoliatum</u>	Cup-plant	uncommon	open, moist ground
<u>S. integrifolium</u>	Rosinweed	rare	old fields, roadsides
<u>Iva annua*</u>	Sumpweed	rare	waste ground
<u>Ambrosia bidentata*</u>	Southern ragweed	occasional	abandoned railroad beds
<u>A. trifida</u>	Giant ragweed	frequent	cultivated fields, waste ground
<u>A. artemisiifolia</u>	Common ragweed	abundant	cultivated fields, pastures, roadsides
<u>Xanthium strumarium</u>	Cocklebur	frequent	cultivated fields, open floodplains, pastures
<u>Helioopsis helianthoides</u>	False sunflower	occasional	open woods
<u>Eclipta alba*</u>	Yerba de tajo	occasional	roadsides
<u>Rudbeckia hirta</u>	Black-eyed susan	uncommon	old fields, roadsides
<u>Helianthus divaricatus</u>	Woodland sunflower	frequent	dry woods
<u>H. strumosus</u>	Pale-leaved sunflower	frequent	dry woods, old fields
<u>Verbesina alternifolia</u>	Yellow ironweed	occasional	old fields, riparian situations, open bottomlands
<u>Coreopsis tripteris</u>	Tall tickseed	rare	old fields, open woods
<u>Bidens aristosa</u>	Swamp marigold	frequent	old fields, roadside ditches, wet pastures
<u>B. comosa</u>	Beggar's-tick	loc. common	open floodplains, roadside ditches, roadsides, abandoned railroad beds
<u>B. bipinnata*</u>	Spanish needles	occasional	waste ground
<u>Galinsoga ciliata*</u>	Peruvian daisy	occasional	old fields
<u>Solidago graminifolia</u>	Grass-leaved goldenrod	rare	upland woods
<u>S. caesia</u>	Zig-zag goldenrod	frequent	upland woods
<u>S. flexicaulis</u>	Broadleaf goldenrod	occasional	old fields
<u>S. juncea</u>	Early goldenrod	occasional	upland woods
<u>S. ulmifolia</u>	Elm-leaved goldenrod	common	old fields
<u>S. canadensis</u>	Tall goldenrod	abundant	upland woods
<u>S. nemoralis</u>	Gray goldenrod	common	old fields, pastures, roadsides
<u>Aster sagittifolius</u>	Arrow-leaved aster	rare	upland woods
<u>A. patens</u>	Barrens aster	frequent	dry woods
<u>Bidens frondosa</u>	Common beggar-ticks	occasional	open floodplains

Appendix A. Continued.

Species	Common Name	Relative Abundance	Habitat(s)
COMPOSITAE cont.			
<u>Aster pilosus</u>	Hairy aster	common	old fields, roadsides, waste ground
<u>A. vimineus</u>	Aster	occasional	roadsides, open bottomlands
<u>A. preaeltus</u>	Willow-aster	occasional	roadsides, pastures, open bottomlands
<u>A. turbinellus</u>	Aster	rare	upland woods
<u>A. laterifolius</u>	Aster	occasional	upland woods
<u>A. simplex</u>	Aster	occasional	open floodplains
<u>Erigeron philadelphicus</u>	Marsh fleabane	frequent	old fields, roadsides
<u>E. annuus</u>	Annual fleabane	frequent	cultivated fields, waste ground, roadsides
<u>E. strigosus</u>	Daisy fleabane	common	old fields, roadsides
<u>E. canadensis</u>	Horseweed	common	pastures, abandoned railroad beds, old fields, waste ground
<u>Achillea millefolium</u> *	Yarrow	frequent	old fields, pastures, roadsides
<u>Antennaria plantaginifolia</u>	Pussy-toes	occasional	dry woods
<u>Gnaphalium obtusifolium</u>	Everlasting	occasional	old fields
<u>Erechtites hieracifolia</u>	Fireweed	occasional	old fields, disturbed woods
<u>Cacalia atriplicifolia</u>	Pale-Indian plantain	occasional	upland woods, old fields
<u>Senecio glabellus</u>	Butterweed	frequent	riparian situations, open bottomlands
<u>S. aureus</u>	Golden ragwort	frequent	riparian situations, open bottomlands
<u>Eupatorium rugosum</u>	White snakeroot	common	upland woods
<u>E. serotinum</u>	Lake boneset	common	old fields, waste ground
<u>E. coelestinum</u>	Mistflower	occasional	roadside ditches
<u>E. perfoliatum</u>	Common boneset	frequent	open floodplains; moist, old fields
<u>Veronica missourica</u>	Ironweed	frequent	old fields, roadsides, pastures
<u>Elephantopus carolinianus</u>	Elephant's-foot	rare	riparian situations
<u>Carduus nutans</u> *	Nodding thistle	abundant	roadsides, pastures
<u>Cirsium discolor</u>	Old field thistle	common	old fields, pastures
<u>Krigia dandelion</u>	False dandelion	occasional	dry woods
<u>Taraxacum officinale</u> *	Common dandelion	common	pastures, roadsides, waste ground
<u>Lactuca canadensis</u>	Wild lettuce	frequent	old fields, open woods
<u>L. serriola</u> *	Prickly lettuce	frequent	roadsides, waste ground, abandoned railroad beds
<u>L. saligna</u> *	Willow lettuce	occasional	roadsides, abandoned railroad beds
<u>L. biennis</u>	Blue lettuce	occasional	upland forests
<u>L. floridana</u>	Blue lettuce	occasional	upland forests, old fields
<u>Pyrrohopus carolinianus</u>	False dandelion	occasional	old fields, roadsides
<u>Prenanthes altissima</u>	White lettuce	rare	upland woods
<u>Hieracium scabrum</u>	Hairy hawkweed	occasional	dry woods
<u>H. gronovii</u>	Hawkweed	frequent	dry woods

Appendix B. Composition and quantitative descriptions of major plant communities in the Illinois Route 3 Study Area.

Species	Relative Density (%)	Relative Frequency (%)	Relative Dominance (%)	Basal Area (cm ² /100 m ²)	Importance Value
UPLAND FOREST					
TREE STRATUM					
<u>Quercus alba</u>	21.4	16.2	22.6	396.8	60.2
<u>Q. velutina</u>	11.6	11.4	15.6	266.5	38.6
<u>Carya glabra</u>	11.6	9.6	9.4	165.2	30.6
<u>Fagus grandifolia</u>	6.1	6.6	11.4	200.0	24.1
<u>Lireodendron tulipifera</u>	6.5	7.8	6.8	118.7	21.1
<u>Liquidambar styraciflua</u>	7.8	4.2	6.8	119.4	18.8
<u>Quercus rubra</u>	3.9	4.8	4.3	74.9	13.0
<u>Acer saccharum</u>	3.4	3.6	2.3	40.0	12.5
<u>Ulmus americana</u>	3.4	3.0	2.2	39.4	8.6
<u>Quercus coccinea</u>	3.2	3.0	2.4	42.6	8.6
<u>Fraxinus americana</u>	2.3	4.2	1.4	25.2	7.9
<u>Sassafras albidum</u>	2.9	2.4	2.5	43.9	7.8
<u>Plantanus occidentalis</u>	2.3	3.0	2.5	43.9	7.8
<u>Carya ovalis</u>	2.3	3.6	1.2	21.3	7.1
<u>C. ovata</u>	1.6	3.0	1.7	29.7	6.3
<u>Juglans nigra</u>	1.3	1.8	0.8	14.8	3.9
<u>Carya cordiformis</u>	1.0	1.8	0.5	9.0	3.3
<u>Nyssa sylvatica</u>	1.0	1.8	0.4	7.7	3.2
<u>Magnolia acuminata</u>	1.0	1.2	1.0	17.4	3.2
<u>Quercus muhlenbergii</u>	1.0	1.2	0.7	12.3	2.9
<u>Q. stellata</u>	1.0	1.2	0.5	9.7	2.7
<u>Ulmus rubra</u>	1.0	1.2	0.5	9.0	2.7
<u>Robinia pseudoacacia</u>	0.6	0.6	1.0	18.1	2.2
<u>Carya laevigata</u>	0.3	0.6	0.9	16.1	1.8
<u>Quercus falcata</u>	0.3	0.6	0.3	4.5	1.2
<u>Diospyrus virginiana</u>	0.3	0.6	0.3	5.8	1.2
<u>Prunus serotina</u>	0.3	0.6	0.2	2.6	1.1
<u>Ostrya virginiana</u>	0.3	0.6	0.1	2.6	1.0
				1757.1	
SAPLING STRATUM					
<u>Asimina triloba</u>	16.2	4.1			20.3
<u>Ostrya virginiana</u>	8.3	6.5			14.8
<u>Acer saccharum</u>	7.2	6.2			13.4
<u>Sassafras albidum</u>	6.6	5.6			12.2
<u>Toxicodendron radicans</u>	5.0	6.8			11.8

Appendix B. Continued

Species	Relative Density (%)	Relative Frequency (%)	Relative Dominance (%)	Basal Area (cm ² /100 m ²)	Importance Value
UPLAND FOREST					
SAPLING STRATUM cont.					
<u>Cornus florida</u>	5.7	4.7			10.4
<u>Carya glabra</u>	4.9	3.8			8.7
<u>Fagus grandifolia</u>	3.8	4.1			7.9
<u>Fraxinus americana</u>	3.0	4.7			7.7
<u>Ulmus rubra</u>	3.7	3.8			7.5
<u>Vitis cinerea</u>	2.2	3.5			5.7
<u>Morus rubra</u>	2.2	2.9			5.1
<u>Lindera benzoin</u>	2.6	1.8			4.4
<u>Cercis canadensis</u>	1.5	2.9			4.4
<u>Quercus alba</u>	1.8	2.4			4.2
<u>Lireodendron tulipifera</u>	1.2	2.7			3.9
<u>Acer rubrum</u>	1.4	2.4			3.8
<u>Ulmus alata</u>	1.2	2.1			3.3
<u>Quercus velutina</u>	1.1	2.1			3.2
<u>Aralia spinosa</u>	1.1	1.8			2.9
<u>Carya ovalis</u>	1.0	1.8			2.8
<u>Parthenocissus quinquefolia</u>	1.0	1.8			2.8
<u>Corylus americana</u>	1.0	1.5			2.5
<u>Acer negundo</u>	1.3	1.2			2.5
<u>Liquidambar styraciflua</u>	1.5	0.9			2.4
<u>Oiospyrus virginiana</u>	0.8	1.5			2.3
<u>Quercus rubra</u>	0.7	1.5			2.2
<u>Carya ovata</u>	0.7	1.5			2.2
<u>Celtis occidentalis</u>	0.6	1.5			2.1
<u>Magnolia acuminata</u>	1.0	0.9			1.9
<u>Arundinaria gigantea</u>	1.2	0.6			1.8
<u>Carya texana</u>	0.5	1.2			1.7
<u>Prunus serotina</u>	0.4	1.2			1.6
<u>Gleditsia triacanthos</u>	1.2	0.3			1.5
<u>Rhus glabra</u>	0.6	0.9			1.5
<u>Robinia pseudoacacia</u>	0.8	0.6			1.4
<u>Carya cordiformis</u>	0.4	0.9			1.3
<u>Ulmus americana</u>	0.6	0.6			1.2
<u>Vaccinium arboreum</u>	0.7	0.3			1.0
<u>Amelanchier arborea</u>	0.3	0.6			0.9
<u>Nyssa sylvatica</u>	0.3	0.6			0.9
<u>Vaccinium vacillans</u>	0.5	0.3			0.8

Appendix B. Continued.

Species	Relative Density (%)	Relative Frequency (%)	Relative Dominance (%)	Basal Area (cm ² /100 m ²)	Importance Value
UPLAND FOREST					
SAMPLING STRATUM cont.					
<u>Quercus muhlenbergii</u>	0.2	0.6			0.8
<u>Carpinus caroliniana</u>	0.2	0.6			0.8
<u>Juglans nigra</u>	0.2	0.6			0.8
<u>Carya tomentosa</u>	0.3	0.3			0.6
<u>Celastrus scandens</u>	0.1	0.3			0.4
<u>Hydrangea arborescens</u>	0.1	0.3			0.4
<u>Euonymus atropurpureus</u>	0.1	0.3			0.4
<u>Celtis laevigata</u>	0.1	0.3			0.4
TREES: 1.43 trees/100m ²					
SAMPLINGS: 43.3 samplings/100 m ²					
HERBACEOUS COVER: 36.3%					
FLOODPLAIN FOREST					
TREE STRATUM					
<u>Acer saccharinum</u>	32.9	17.2	30.9	573.6	81.0
<u>Populus deltoides</u>	13.2	24.1	18.5	343.3	55.8
<u>Salix nigra</u>	19.7	10.3	22.3	412.9	52.3
<u>Fraxinus pennsylvanica</u>	17.1	17.2	14.2	263.2	48.5
<u>Liquidambar styraciflua</u>	7.9	10.3	4.3	80.0	22.5
<u>Acer negundo</u>	5.3	10.3	4.5	83.9	20.1
<u>Carya illinoensis</u>	2.6	6.9	2.3	41.9	11.8
<u>Platanus occidentalis</u>	1.3	3.4	3.0	54.8	7.7
				1853.6	
SAMPLING STRATUM					
<u>Vitis aestivalis</u>	26.4	12.5			38.9
<u>Cornus foemina</u>	14.3	15.6			29.9
<u>Forestiera acuminata</u>	12.1	9.4			21.5
<u>Acer saccharinum</u>	11.0	9.4			20.4
<u>Fraxinus pennsylvanica</u>	8.6	9.4			18.2
<u>Carya laevigata</u>	7.7	9.4			17.1
<u>Acer negundo</u>	4.4	6.3			10.7
<u>Crataegus viridis</u>	3.3	6.3			9.6
<u>Toxicodendron radicans</u>	5.5	3.1			8.6
<u>Ilex decidua</u>	2.2	6.3			8.5
<u>Liquidambar styraciflua</u>	1.1	3.1			4.2

Appendix B. Continued.

Species	Relative Density (%)	Relative Frequency (%)	Relative Dominance (%)	Basal Area (cm ² /100 m ²)	Importance Value
FLOODPLAIN FOREST					
SAPLING STRATUM cont.					
<u>Diospyrus virginiana</u>	1.1	3.1			4.2
<u>Ulmus rubra</u>	1.1	3.1			4.2
<u>U. americana</u>	1.1	3.1			4.2
TREES: 1.90 trees/100m ²					
SAPLINGS: 22.75 saplings/100m ²					
HERBACEOUS COVER: 14.3%					
SUCCESSIONAL FIELD					
TREE STRATUM					
<u>Plantanus occidentalis</u>	13.6	11.0	19.5	49.0	44.1
<u>Quercus muhlenbergii</u>	9.0	11.0	8.8	47.0	38.8
<u>Populus deltoides</u>	9.0	11.0	17.9	44.5	37.9
<u>Acer negundo</u>	13.6	5.9	7.2	18.1	26.7
<u>Celtis occidentalis</u>	9.0	5.9	5.9	14.8	20.8
<u>Liquidambar styraciflua</u>	9.0	5.9	5.3	12.9	20.2
<u>Carya glabra</u>	4.5	5.9	4.6	11.6	15.0
<u>Sassafras albidum</u>	4.5	5.9	4.1	10.3	14.4
<u>Gleditsia triacanthos</u>	4.5	5.9	3.4	8.4	13.8
<u>Diospyrus virginiana</u>	4.5	5.9	3.3	8.4	13.7
<u>Carya laevigata</u>	4.5	5.9	2.7	7.1	13.1
<u>Juglans nigra</u>	4.5	5.9	2.6	6.5	13.0
<u>Morus rubra</u>	4.5	5.9	2.5	6.5	12.9
<u>Ulmus rubra</u>	4.5	5.9	2.2	5.8	12.6
				251.0	
SAPLING STRATUM					
<u>Rhus glabra</u>	24.6	9.4			34.0
<u>Vitis cinerea</u>	10.2	8.2			18.4
<u>Acer negundo</u>	6.4	9.4			15.8
<u>Diospyrus virginiana</u>	7.2	8.2			15.4
<u>Sassafras albidum</u>	8.7	4.7			13.4
<u>Ulmus americana</u>	3.8	9.4			13.2
<u>Cornus drummondii</u>	1.9	5.9			7.8
<u>Cornus foemina</u>	4.5	1.2			6.7
<u>Toxicodendron radicans</u>	3.0	3.5			6.5
<u>Ulmus americana</u>	1.5	4.7			6.2
<u>Juglans nigra</u>	2.3	3.5			5.8

Appendix B. Continued.

Species	Relative Density (%)	Relative Frequency (%)	Relative Dominance (%)	Basal Area (cm ² /100 m ²)	Importance Value
SUCCESSIONAL FIELD cont.					
SAPLING STRATUM					
<u>Rhus copallina</u>	2.6	2.4			5.0
<u>Carya illinoensis</u>	2.3	2.4			4.7
<u>Celtis occidentalis</u>	1.9	2.4			4.3
<u>Lireodendron tulipifera</u>	3.0	1.2			4.2
<u>Celtis laevigata</u>	3.0	1.2			4.2
<u>Quercus muhlenbergii</u>	0.7	2.4			3.1
<u>Morus rubra</u>	0.7	2.4			3.1
<u>Quercus rubra</u>	1.9	1.2			3.1
<u>Prunus americana</u>	1.5	1.2			2.7
<u>Liquidambar styraciflua</u>	1.5	1.2			2.7
<u>Prunus serotina</u>	0.7	1.2			1.9
<u>Ulmus alata</u>	0.7	1.2			1.9
<u>Sambucus canadensis</u>	0.7	1.2			1.9
<u>Malus coronaria</u>	0.7	1.2			1.9
<u>Robinia psuedoacacia</u>	0.7	1.2			1.9
<u>Populus deltoides</u>	0.4	1.2			1.6
<u>Campsis radicans</u>	0.4	1.2			1.6
<u>Plantanus occidentalis</u>	0.4	1.2			1.6
<u>Fraxinus pennsylvannica</u>	0.4	1.2			1.6
<u>Carya cordiformis</u>	0.4	1.2			1.6
<u>Quercus alba</u>	0.4	1.2			1.6
<u>Quercus velutina</u>	0.4	1.2			1.6
TREES: 0.25 trees/100m ²					
SAPLINGS: 31.40 saplings/100m ²					
HERBACEOUS COVER: 55.5%					

Appendix C

AMPHIBIANS AND REPTILES KNOWN OR POTENTIAL IN THE ILLINOIS
ROUTE 3 STUDY AREA AND THEIR PREFERRED HABITATS

Sources: M.A. Morris, Southern Illinois University. Personal
observation and collection records. 1984.

Herpetological collections at:
Illinois Natural History Survey, Champaign.
Department of Zoology, Southern Illinois University,
Carbondale.
Field Museum of Natural History, Chicago.

Morris and Smith 1981

Smith 1961

Taxonomic Keys: Smith 1961

Note: List contains scientific names of species mentioned
by common name in the text. Nomenclature follows Smith
(1961). Preferred habitat(s) coded according to Table
1.

Appendix C. Amphibians and reptiles known or potential in the Illinois Route 3 Study Area and their preferred habitats.

Species	Known*	Potential		Preferred Habitat(s)
		Expected	Not Expected	
Spotted salamander <u>Ambystoma maculatum</u>	X*			1, 2
Marbled salamander <u>A. opacum</u>	X			1, 2
Mole salamander <u>A. talpoideum</u>		X		2
Small-mouthed salamander <u>A. texanum</u>	X*			2, 5b
Eastern tiger salamander <u>A. tigrinum tigrinum</u>			X	1, 2
Central newt <u>Notophthalmus viridescens louisianensis</u>		X		2, 3
Eastern long-tailed salamander <u>Eurycea longicauda longicauda</u>			X	1
Cave salamander <u>E. lucifuga</u>			X	1
Zigzag salamander <u>Plethodon dorsalis</u>			X	1
Slimy salamander <u>P. glutinosus glutinosus</u>	X*			1
Mudpuppy <u>Necturus maculosus maculosus</u>		X		4ab
Western lesser siren <u>Siren intermedia nettingi</u>		X		4ab
Eastern spadefoot toad <u>Scaphiopus holbrookii</u>		X		2
Dwarf American toad <u>Bufo americanus charlesmithi</u>		X		1, 2
Fowler's toad <u>B. woodhousei fowleri</u>	X*			1
Blanchard's cricket frog <u>Acris crepitans blanchardi</u>	X*			3, 4ab
Upland chorus frog <u>Pseudacris triseriata feriarum</u>		X		2
Western bird-voiced treefrog <u>Hyla avivoca avivoca</u>			X	2
Green treefrog <u>H. cinerea</u>			X	2
Northern spring peeper <u>H. crucifer crucifer</u>	X*			1, 2
Gray treefrog complex <u>H. versicolor / chrysoscelis</u>	X*			1, 2
Northern crawfish frog <u>Rana areolata circulosa</u>			X	5b

Appendix C. Continued.

Species	Known*	Potential		Preferred Habitat(s)
		Expected	Not Expected	
Bullfrog <u>R. catesbeiana</u>	X*			3, 4ab, 5e
Green frog <u>R. clamitans</u>		X		4a
Pickereel frog <u>R. palustris</u>			X	2, 3
Plains leopard frog <u>R. blairi</u>	X*			3
Southern leopard frog <u>R. sphenocephala</u>	X*			3, 5e
Snapping turtle <u>Chelydra serpentina</u>	X*			3, 4ab, 5e
Alligator snapping turtle <u>Macroclmys temmincki</u>		?		4b
Stinkpot <u>Sternotherus odoratus</u>	X*			3, 4ab, 5e
Eastern mud turtle <u>Kinosternon subrubrum</u>		X		2, 3
Eastern box turtle <u>Terrapene carolina carolina</u>	X*			1
Painted turtle <u>Chrysemys picta</u>	X*			3, 4ab, 5e
Red-eared turtle <u>Pseudemys scripta elegans</u>	X*			3, 4ab, 5e
Slider <u>P. concinna hieroglyphica</u>			X	3
False map turtle <u>Graptemys pseudogeographica</u>	X			4b
Ouachita map turtle <u>G. ouachitensis</u>		X		4b
Map turtle <u>G. geographica</u>		X		4b
Midland smooth softshell turtle <u>Trionyx muticus muticus</u>		?		4ab
Eastern spiny softshell turtle <u>T. spiniferus spiniferus</u>	X*			3, 4ab
Northern fence lizard <u>Sceloporus undulatus hyacinthinus</u>	X*			1
Western slender glass lizard <u>Ophisaurus attenuatus attenuatus</u>			X	5b
Ground skink <u>Scincella lateralis</u>	X*			1
Five-lined skink <u>Eumeces fasciatus</u>	X*			1

Appendix C. Continued.

Species	Known*	Potential		Preferred Habitat(s)
		Expected	Not Expected	
Broad-headed skink <u>E. laticeps</u>		X		1
Midwest worm snake <u>Carphophis amoenus helenae</u>		X		1
Western mud snake <u>Farancia abacura reinwardti</u>		X		2, 3
Ringneck snake <u>Diadophis punctatus</u>		X		1
Eastern hognose snake <u>Heterodon platyrhinos</u>	X*			1, 2, 5b
Eastern rough green snake <u>Opheodrys aestivus aestivus</u>	X*			1
Racer <u>Coluber constrictor</u>	X*			1, 5b
Rat snake <u>Elaphe obsoleta</u>	X*			1
Prairie kingsnake <u>Lampropeltis calligaster calligaster</u>			X	5b
Common kingsnake <u>L. getulus</u>	X*			1, 2
Red milk snake <u>L. triangulum sypila</u>	X*			1
Western ribbon snake <u>Thamnophis proximus proximus</u>	X			2
Eastern garter snake <u>I. sirtalis sirtalis</u>	X*			1, 2
Western smooth earth snake <u>Virginia valeriae elegans</u>		X		2
Midland brown snake <u>Storeria dekayi wrightorum</u>	X			1, 2
Northern red-bellied snake <u>S. occipitamaculata occipitamaculata</u>		X		1
Green water snake <u>Nerodia cyclopion cyclopion</u>			X	3
Yellow-bellied water snake <u>N. erythrogaster flavigaster</u>	X*			3
Midland water snake <u>N. sipedon pleuralis</u>	X*			4a
Diamondback water snake <u>N. rhombifera rhombifera</u>	X*			3, 4ab
Western cottonmouth <u>Agkistrodon piscivorus leucostoma</u>		X		3
Copperhead <u>A. contortrix</u>	X			1
Timber rattlesnake <u>Crotalus horridus</u>	X			1

* Indicates species encountered during this survey or within the past 5 years.

Appendix D

BIRDS KNOWN OR POTENTIAL AND THEIR RESIDENCE
IN THE ILLINOIS ROUTE 3 STUDY AREA

Sources: T.E. Fink, and E.A. Anderson, Southern Illinois University.
Personal observation and collection records. 1984.

Horseshoe Lake Christmas Bird Count Results 1974-1983
(IDOC unpubl. data)

Illinois Spring Bird Counts, Alexander County 1973-1984
(IDOC unpubl. data)

Bohlen 1978

Kleen 1977

Taxonomic Keys: Peterson 1980

Note: List contains scientific names of species mentioned by
common name in the text. Nomenclature follows American
Ornithologist's Union. Residence refers to period of
year when a species would be expected to occur on the
area and follows Bohlen (1978):

X - abundant, common, or fairly common

U - uncommon; occurs in small numbers and may be limited
by habitat

O - occasional; occurs a few times a year

R - rare; occurs once or twice a year, some years not at
all

Appendix D. Birds known or potential and their residence in the Illinois Route 3 Study Area.

Species	Known	Potential	Residence			
			Permanent	Summer	Winter	Migrant
Pied-billed grebe (<i>Podilymbus podiceps</i>)		X				X
Horned grebe (<i>Podiceps auritus</i>)		X				X
Double-crested cormorant (<i>Phalacrocorax auritus</i>)		X				X
American bittern (<i>Botaurus lentiginosus</i>)		X		R		X
Least Bittern (<i>Ixobrychus exilis</i>)		X		X		
Great blue heron (<i>Ardea herodias</i>)		X	X			
Great egret (<i>Casmerodius albus</i>)	X			X		
Snowy egret (<i>Egretta thula</i>)		X		R		X
Little blue heron (<i>Egretta caerulea</i>)	X			X		
Cattle egret (<i>Bubulcus ibis</i>)	X			X		
Green-backed heron (<i>Butorides striatus</i>)	X			X		
Black-crowned night heron (<i>Nycticorax nycticorax</i>)		X		X		
Yellow-crowned night heron (<i>Nyctanassa violaceus</i>)		X		X		
Tundra swan (<i>Cygnus columbianus</i>)		X			R	R
Snow goose (<i>Chen caerulescens</i>)		X			X	
Canada goose (<i>Branta canadensis</i>)	X				X	
Wood duck (<i>Aix sponsa</i>)	X			X		
Green-winged teal (<i>Anas crecca</i>)		X			X	
American black duck (<i>A. rubripes</i>)		X			X	
Mallard (<i>A. platyrhynchos</i>)		X	X			
Northern pintail (<i>A. acuta</i>)		X			X	
Blue-winged teal (<i>A. discors</i>)				O	R	X
Northern shoveler (<i>A. clypeata</i>)		X			X	
Gadwall (<i>A. strepera</i>)		X			X	
American wigeon (<i>A. americana</i>)		X			X	
Canvasback (<i>Aythya valisineria</i>)				R*	X	
Redhead (<i>A. americana</i>)		X		R*	X	
Ring-necked duck (<i>A. collaris</i>)		X		R*	X	
Lesser scaup (<i>A. affinis</i>)		X		R*	X	
Common goldeneye (<i>Bucephala clangula</i>)		X		R*	X	
Bufflehead (<i>B. albeola</i>)		X			X	
Hooded merganser (<i>Lophodytes cucullatus</i>)		X	X			
Common merganser (<i>Mergus merganser</i>)		X		R	X	
Red-breasted merganser (<i>M. serrator</i>)		X		R	O	X
Ruddy duck (<i>Oxyura jamaicensis</i>)		X		R	X	
Turkey vulture (<i>Cathartes aura</i>)	X		X			

Appendix D. Continued

Species	Known	Potential	Residence			
			Permanent	Summer	Winter	Migrant
Osprey (<u>Pandion haliaetus</u>)		X				X
Mississippi kite (<u>Ictinia mississippiensis</u>)	X			X		
Bald eagle (<u>Haliaeetus leucocephalus</u>)	X				X	
Northern harrier (<u>Circus cyaneus</u>)	X			0	X	
Sharp-shinned hawk (<u>Accipiter striatus</u>)		X			X	
Cooper's hawk (<u>A. cooperii</u>)		X	X			
Northern goshawk (<u>A. gentilis</u>)		X			X	
Red-shoulder hawk (<u>Buteo lineatus</u>)		X	X			
Broadwinged hawk (<u>B. platypterus</u>)	X			X		
Red-tailed hawk (<u>B. jamaicensis</u>)	X		X			
Rough-legged hawk (<u>B. lagopus</u>)		X			X	
Golden eagle (<u>Aquila chrysaetos</u>)		X			X	
American kestrel (<u>Falco sparverius</u>)	X		X			
Martin (<u>F. columbarius</u>)		X			R	X
Wild turkey (<u>Meleagris gallopavo</u>)	X		X			
Northern bobwhite (<u>Colinus virginianus</u>)	X		X			
Virginia rail (<u>Rallus limicola</u>)		X		R		X
Sora (<u>Porzana carolina</u>)		X		R		X
American Coot (<u>Fulica americana</u>)		X		U	U	
Semipalmated plover (<u>Charadrius semipalmatus</u>)		X				X
Killdeer (<u>C. vociferus</u>)	X		X			
Greater yellowlegs (<u>Tringa melanoleuca</u>)		X				X
Lesser yellowlegs (<u>T. flavipes</u>)		X				X
Solitary sandpiper (<u>T. solitaria</u>)		X				X
Spotted sandpiper (<u>Actitis macularia</u>)		X		R		X
Lesser golden plover (<u>Pluvialis dominica</u>)		X				X
Semipalmated sandpiper (<u>Calidris pusilla</u>)		X				X
Least sandpiper (<u>C. minutilla</u>)		X				X
White-rumped sandpiper (<u>C. fuscicollis</u>)		X				X
Pectoral sandpiper (<u>C. melanotos</u>)		X				X
Stilt sandpiper (<u>C. himantopus</u>)		X				X
Short-billed dowitcher (<u>Limnodromus griseus</u>)		X				X
Long-billed dowitcher (<u>L. scolopaceus</u>)		X				X
Common snipe (<u>Gallinago gallinago</u>)		X			U	X
Ring-billed gull (<u>Larus delawarensis</u>)	X				X	
Herring gull (<u>L. argentatus</u>)		X			X	

Appendix D. Continued

Species	Known	Potential	Residence			
			Permanent	Summer	Winter	Migrant
Common tern (<i>Sterna hirundo</i>)		X				X
Least tern (<i>S. antillarum</i>)		X		X		
Rock dove (<i>Columba livia</i>)	X		X			
Mourning dove (<i>Zenaida macroura</i>)	X		X			
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	X			X		
Eastern screech owl (<i>Otus asio</i>)		X	X			
Great horned owl (<i>Bubo virginianus</i>)		X	X			
Barred owl (<i>Strix varia</i>)	X		X			
Long-eared owl (<i>Asio otus</i>)		X		R	X	
Short-eared owl (<i>Asio flammeus</i>)		X			X	
Common nighthawk (<i>Chordeiles minor</i>)	X			X		
Chuck-will's-widow (<i>Caprimulgus carolinensis</i>)		X		X		
Whip-poor-will (<i>C. vociferus</i>)		X		X		
Chimney swift (<i>Chaetura pelagica</i>)	X			X		
Ruby-throated hummingbird (<i>Archilochus colubris</i>)	X			X		
Belted kingfisher (<i>Ceryle alcyon</i>)	X		X			
Red-headed woodpecker (<i>Melanerpes erythrocephalus</i>)	X		X			
Red-bellied woodpecker (<i>M. carolinus</i>)	X		X			
Yellow-bellied sapsucker (<i>Sphyrapicus varius</i>)	X			X		
Downy woodpecker (<i>Picoides pubescens</i>)	X		X			
Hairy woodpecker (<i>P. villosus</i>)	X		X			
Northern flicker (<i>Colaptes auratus</i>)	X		X			
Pileated woodpecker (<i>Dryocopus pileatus</i>)	X		X			
Olive-sided flycatcher (<i>Contopus borealis</i>)		X				X
Eastern wood-pewee (<i>C. virens</i>)	X			X		
Yellow-bellied flycatcher (<i>Empidonax flaviventris</i>)		X				X
Acadian flycatcher (<i>E. virescens</i>)	X			X		
Alder flycatcher (<i>E. alnorum</i>)	X					X
Least flycatcher (<i>E. minimus</i>)	X					X
Eastern phoebe (<i>Sayornis phoebe</i>)	X			X	0	
Great crested flycatcher (<i>Myiarchus crinitus</i>)	X			X		
Eastern kingbird (<i>Tyrannus tyrannus</i>)	X			X		
Horned lark (<i>Eremophila alpestris</i>)		X	X			
Purple martin (<i>Progne subis</i>)	X			X		
Tree swallow (<i>Tachycineta bicolor</i>)	X			X		
Northern rough-winged swallow (<i>Stelgidopteryx serripennis</i>)	X			X		

Appendix D. Continued

Species	Known	Potential	Residence			
			Permanent	Summer	Winter	Migrant
Bank swallow (<u>Riparia riparia</u>)	X			X		
Cliff swallow (<u>Petrochelidon pyrrhonota</u>)		X		R		X
Barn swallow (<u>Hirundo rustica</u>)	X			X		
Blue Jay (<u>Cyanocitta cristata</u>)	X		X			
American crow (<u>Corvus brachyrhynchos</u>)	X		X			
Fish crow (<u>C. ossifragus</u>)		X		X		
Carolina chickadee (<u>Parus carolinensis</u>)	X		X			
Tufted titmouse (<u>Parus bicolor</u>)	X		X			
Red-breasted nuthatch (<u>Sitta canadensis</u>)		X			X	
White-breasted nuthatch (<u>S. carolinensis</u>)	X		X			
Brown creeper (<u>Certhia americana</u>)		X		O	X	
Carolina wren (<u>Thryothorus ludovicianus</u>)	X		X			
House wren (<u>Troglodytes aedon</u>)	X			X		
Winter wren (<u>T. troglodytes</u>)		X			X	
Sedge wren (<u>Cistothorus platensis</u>)		X		R	R	X
Marsh wren (<u>C. palustris</u>)		X		R		
Golden-crowned kinglet (<u>Regulus satrapa</u>)		X			X	
Ruby-crowned kinglet (<u>R. calendula</u>)	X				X	
Blue-gray gnatcatcher (<u>Polioptila caerulea</u>)	X			X		
Eastern bluebird (<u>Sialia sialis</u>)	X		X			
Veery (<u>Catharus fuscescens</u>)		X				X
Gray-cheeked thrush (<u>C. minimus</u>)						
Swainson's thrush (<u>C. ustulatus</u>)		X				X
Hermit thrush (<u>C. guttatus</u>)		X			X	
Wood thrush (<u>Hylocichla mustelina</u>)	X			X		
American robin (<u>Turdus migratorius</u>)	X		X			
Gray catbird (<u>Dumetella carolinensis</u>)	X			X	R	
Northern mockingbird (<u>Mimus polyglottos</u>)	X		X			
Brown thrasher (<u>Toxostoma rufum</u>)	X		X			
Water pipit (<u>Anthus spinoletta</u>)		X				X
Cedar waxwing (<u>Bombycilla cedrorum</u>)		X	X			
Loggerhead shrike (<u>Lanius ludovicianus</u>)	X		X			
European starling (<u>Sturnus vulgaris</u>)	X		X			
White-eyed vireo (<u>Vireo griseus</u>)	X			X		
Bell's vireo (<u>V. bellii</u>)	X			X		
Solitary vireo (<u>V. solitarius</u>)	X					X

Appendix D. Continued

Species	Known	Potential	Residence			
			Permanent	Summer	Winter	Migrant
Yellow-throated vireo (<i>V. flavifrons</i>)	X			X		
Warbling vireo (<i>V. gilvus</i>)	X			X		
Philadelphia vireo (<i>V. philadelphicus</i>)		X				X
Red-eyed vireo (<i>V. olivaceus</i>)	X			X		
Blue-winged warbler (<i>Vermivora pinus</i>)		X		X		
Golden-winged warbler (<i>V. chrysoptera</i>)		X				X
Tennessee warbler (<i>V. peregrina</i>)	X					X
Nashville warbler (<i>V. ruficapilla</i>)	X					X
Northern parula (<i>Parula americana</i>)	X			X		
Yellow warbler (<i>Dendroica petechia</i>)		X		X		
Chestnut-sided warbler (<i>D. pensylvanica</i>)		X				X
Magnolia warbler (<i>D. magnolia</i>)	X					X
Cape may warbler (<i>D. tigrina</i>)		X				X
Yellow-rumped warbler (<i>D. coronata</i>)	X				X	
Black-throated green warbler (<i>D. virens</i>)	X					X
Blackburnian warbler (<i>D. fusca</i>)	X					X
Yellow-throated warbler (<i>D. dominica</i>)	X			X		
Pine warbler (<i>D. pinus</i>)		X		X	R	
Prairie warbler (<i>D. discolor</i>)	X			X		
Palm warbler (<i>D. palmarum</i>)		X				X
Bay-breasted warbler (<i>D. castanea</i>)	X					X
Blackpoll warbler (<i>D. striata</i>)	X					X
Cerulean warbler (<i>D. cerulea</i>)		X		X		
Black-and-white warbler (<i>Mniotilta varia</i>)	X					X
American redstart (<i>Setophaga ruticilla</i>)	X			X		
Prothonotary warbler (<i>Protonotaria citrea</i>)	X			X		
Worm-eating warbler (<i>Helmitheros vermivorus</i>)	X			X		
Swainson's warbler (<i>Limothlypis swainsonii</i>)	X			X		
Ovenbird (<i>Seiurus aurocapillus</i>)		X		X		
Northern waterthrush (<i>S. noveboracensis</i>)		X				X
Louisiana waterthrush (<i>S. motacilla</i>)	X			X		
Kentucky warbler (<i>Oporornis formosus</i>)	X			X		
Mourning warbler (<i>O. philadelphia</i>)	X					X
Common yellowthroat (<i>Geothlypis trichas</i>)	X			X	R	
Hooded warbler (<i>Wilsonia citrina</i>)	X			X		
Wilson's warbler (<i>Wilsonia pusilla</i>)	X					X

Appendix D. Continued

Species	Known	Potential	Residence			
			Permanent	Summer	Winter	Migrant
Canada warbler (<i>M. canadensis</i>)		X				X
Yellow-breasted chat (<i>Icteria virens</i>)	X			X		
Summer tanager (<i>Piranga rubra</i>)	X			X		
Scarlet tanager (<i>P. olivacea</i>)	X			X		
Northern cardinal (<i>Cardinalis cardinalis</i>)	X		X			
Rose-breasted grosbeak (<i>Pheucticus ludovicianus</i>)	X		X			
Blue grosbeak (<i>Guiraca caerulea</i>)	X			X		
Indigo bunting (<i>Passerina cyanea</i>)	X			X	R	
Dickcissel (<i>Spiza americana</i>)	X			X	R	
Rufous-sided towhee (<i>Pipilo erythrophthalmus</i>)	X		X			
American tree sparrow (<i>Spizella arborea</i>)		X			X	
Chipping sparrow (<i>S. passerina</i>)	X			X	R	
Field sparrow (<i>S. pusilla</i>)	X		X			
Vesper sparrow (<i>Pooecetes gramineus</i>)		X				X
Savannah sparrow (<i>Passerculus sandwichensis</i>)		X			X	X
Le Conte's sparrow (<i>Ammodramus leconteii</i>)		X			X	X
Fox sparrow (<i>Passerella iliaca</i>)	X				X	
Song sparrow (<i>Melospiza melodia</i>)	X		X			
Lincoln's sparrow (<i>M. lincolnii</i>)		X			R	X
Swamp sparrow (<i>M. georgiana</i>)	X				X	
White-throated sparrow (<i>Zonotrichia albicollis</i>)	X				X	
White-crowned sparrow (<i>Z. leucophrys</i>)	X				X	
Harris' sparrow (<i>Z. querula</i>)		X				R
Dark-eyed junco (<i>Junco hyemalis</i>)	X				X	
Lceland longspur (<i>Calcarius lapponicus</i>)		X			X	
Snow bunting (<i>Plectrophenax nivalis</i>)						
Bobolink (<i>Dolichonyx oryzivorus</i>)		X				X
Pied-winged blackbird (<i>Agelaius phoeniceus</i>)	X		X			
Eastern meadowlark (<i>Sturnella magna</i>)	X		X			
Western meadowlark (<i>S. neglecta</i>)		X			U	
Pusty blackbird (<i>Euphagus carolinus</i>)		X			X	
Brewer's blackbird (<i>E. cyanocephalus</i>)		X			X	
Common grackle (<i>Quiscalus quiscula</i>)	X		X			
Brown-headed cowbird (<i>Molothrus ater</i>)	X		X			
Orchard oriole (<i>Icterus spurius</i>)	X			X		
Northern oriole (<i>I. galbula</i>)	X			X		

Appendix D. Continued

Species	Known	Potential	Residence			
			Permanent	Summer	Winter	Migrant
Purple finch (<u>Carpodacus purpureus</u>)		X			X	
Pine siskin (<u>Carduelis pinus</u>)		X			X	
American goldfinch (<u>C. tristis</u>)	X		X			
Evening grosbeak (<u>Coccothraustes vespertinus</u>)		X			X	
House sparrow (<u>Passer domesticus</u>)	X		X			

Appendix E. Number (N), relative abundance (RA%), relative frequency of occurrence (RF%), number of different census stops where species was recorded (CS), and habitat preferences (HP) based on driving surveys for birds in the Illinois Route 3 Study Area; May-December 1984.

Species ¹	N	RA%	RF%	CS	HP ²
European starling	680	13.13	100	19	5bd
Common grackle	582	11.24	75	25	3, 4a, 5ade
Red-winged blackbird	324	6.26	88	22	3, 4a, 5ade
American robin	261	5.04	100	26	5ad
Indigo bunting	240	4.63	75	30	1pu, 2, 5cd
Blue jay	233	4.50	100	30	1pu, 2, 5d
House sparrow	225	4.35	100	16	5d
Northern cardinal	161	3.11	100	30	1pu, 2, 5d
American goldfinch	157	3.03	100	26	1p, 5b
Barn swallow	133	2.57	75	19	5abd
Cedar waxwing	132	2.55	50	10	1p, 2
Tufted titmouse	130	2.51	100	30	1pu, 2
Chimney swift	130	2.51	75	16	5d
American crow	119	2.30	100	27	2, 4b, 5d
Brown-headed cowbird	118	2.28	75	26	2, 5abd
Common yellowthroat	92	1.78	63	26	3, 5de
Eastern meadowlark	83	1.60	75	15	5b
Red-bellied woodpecker	75	1.45	100	25	1pu, 2
Rock dove	69	1.33	75	7	5d
Eastern wood-pewee	58	1.12	63	27	1pu, 2
Downy woodpecker	52	1.00	100	21	1pu, 2
Northern flicker	45	0.87	75	21	1pu, 2
Canada goose	43	0.83	38	6	Migrant
Bobwhite	42	0.81	63	19	1p, 5ad
White-throated sparrow	41	0.79	38	11	Migrant
Field sparrow	37	0.72	75	16	5bc
Rough-winged swallow	37	0.72	75	6	2, 3, 5e
Mourning dove	36	0.70	63	13	5d
Killdeer	34	0.66	88	11	5ab
Northern oriole	33	0.64	38	17	1p, 2, 5d
White-eyed vireo	33	0.64	75	18	1pu, 2
Eastern bluebird	31	0.60	88	11	1p, 5d
Yellow-billed cuckoo	27	0.52	38	16	1pu, 2
Orchard oriole	26	0.50	63	15	2, 5d
Brown thrasher	25	0.48	75	11	2, 5d
Carolina chickadee	25	0.48	75	17	1pu, 2

Appendix E. Continued.

Species ¹	N	RA%	RF%	CS	HP ²
White-breasted nuthatch	24	0.46	75	15	1pu, 2
Chipping sparrow	23	0.44	63	9	5d
Red-headed woodpecker	22	0.43	88	11	1pu, 2
Warbling vireo	21	0.41	38	12	2, 4a, 5c
Blue-gray gnatcatcher	20	0.39	50	9	1pu, 2
Ruby-throated hummingbird	20	0.39	63	11	1pu, 2
Red-tailed hawk	20	0.39	88	10	1pu, 2
Eastern kingbird	19	0.37	63	7	2, 5b
Acadian flycatcher	18	0.35	38	10	1pu, 2
Carolina wren	18	0.35	63	11	1pu, 2, 4a
Song sparrow	18	0.35	50	6	5cd
Cattle egret	17	0.33	38	3	5b
Green heron	17	0.33	50	8	3, 4a, 5e
Wood thrush	17	0.33	63	8	1pu, 2
Great-crested flycatcher	16	0.31	38	12	1pu, 2, 4a
Yellow-breasted chat	16	0.31	38	13	5d
Purple martin	16	0.31	50	5	5d
Yellow-rumped warbler	15	0.29	38	7	Migrant
Junco	15	0.30	25	6	Migrant
Rufous-sided towhee	14	0.27	63	7	1pu, 5d
Loggerhead shrike	14	0.27	88	6	5d
Pileated woodpecker	13	0.25	75	10	1pu, 2
Mockingbird	13	0.25	75	6	5d
Tennessee warbler	11	0.21	38	8	Migrant
Red-eyed vireo	11	0.21	63	5	1pu, 2
Belted kingfisher	11	0.21	63	5	3, 4a
Kentucky warbler	10	0.19	50	8	1pu, 2
Ring-billed gull	10	0.19	25	1	Migrant
Summer tanager	9	0.17	63	5	1pu, 2
Eastern phoebe	8	0.15	38	7	2, 4a
White-crowned sparrow	8	0.15	13	1	Migrant
Little blue heron	7	0.14	13	2	4b
Prothonotary warbler	7	0.14	38	3	2, 4a
Wood duck	6	0.12	25	4	2, 3, 4a
Blackpoll warbler	6	0.12	13	6	Migrant
Rose-breasted grosbeak	6	0.12	25	6	Migrant
Hairy woodpecker	6	0.12	50	4	1pu, 2
American kestrel	6	0.12	38	5	5abd
Yellow-throated vireo	5	0.10	38	5	1pu, 2

Appendix E. Continued.

Species ¹	N	RA%	RF%	CS	HP ²
Oickcissel	5	0.10	13	3	5bc
Tree swallow	5	0.10	13	4	3, 4ab, 5e
Blue-winged teal	4	0.08	13	1	3
Turkey vulture	4	0.08	25	2	1pu
Northern parula	4	0.08	38	4	2, 4a
Bank swallow	4	0.08	25	2	4ab
Fox sparrow	4	0.08	25	4	Migrant
Mississippi kite	3	0.06	25	3	2, 4b
Least flycatcher	3	0.06	13	2	Migrant
Gray catbird	3	0.06	38	2	1pu, 2
Bay-breasted warbler	3	0.06	25	2	Migrant
Yellow-bellied sapsucker	3	0.06	25	1	Migrant
Swamn sparrow	3	0.06	25	1	Migrant
Louisiana waterthrush	2	0.04	25	2	4a
Wilson's warbler	2	0.04	25	2	Migrant
Magnolia warbler	2	0.04	25	2	Migrant
American redstart	2	0.04	25	2	1pu, 2
Scarlet tanager	2	0.04	25	2	1pu, 2
House wren	2	0.04	13	1	1pu, 2, 5d
Northern harrier	2	0.04	13	2	5ab
Broad-winged hawk	1	0.02	13	1	1pu
Common nighthawk	1	0.02	13	1	5ad
Alder flycatcher	1	0.02	13	1	Migrant
Solitary vireo	1	0.02	13	1	Migrant
Black-and-white warbler	1	0.02	13	1	Migrant
Nashville warbler	1	0.02	13	1	Migrant
Prairie warbler	1	0.02	13	1	5c
Blackburnian warbler	1	0.02	13	1	Migrant
Yellow-throated warbler	1	0.02	13	1	1pu
Hooded warbler	1	0.02	13	1	1pu, 2
Mourning warbler	1	0.02	13	1	Migrant
Blue grosbeak	1	0.02	13	1	Migrant
Black-throated green warbler	1	0.02	13	1	Migrant
Ruby-crowned kinglet	1	0.02	13	1	Migrant

¹ Arranged in order of relative abundance.² Habitat preference numbers refer to habitat type codes listed in Table 2.

Appendix F

MAMMALS KNOWN OR POTENTIAL IN THE ILLINOIS ROUTE 3 STUDY AREA
AND THEIR PREFERRED HABITATS

Sources: E.A. Anderson, Southern Illinois University. Personal
observation and collection records. 1984.

Barbour and Davis 1969

Hoffmeister and Mohr 1972

Terpening et al. 1973

Thom 1981

Taxonomic Keys: Barbour and Davis 1969

Hoffmeister and Mohr 1972

Note: List contains scientific names of species mentioned by
common name in the text. Nomenclature follows Burt and
Grossenheider (1976). Preferred habitat(s) are based
on field surveys and literature sources, and coded
according to Table 1.

Appendix F. Mammals known or potential in the Illinois Route 3 Study Area and their preferred habitats.

Species	Known	Potential		Preferred Habitat(s)
		Expected	Not Expected	
Opossum <u>Didelphis marsupialis</u>	X			1, 2, 5abcd
Southeastern shrew <u>Sorex longirostris</u>	X			1, 2, 5c
Least shrew <u>Cryptotis parva</u>		X		5c
Shorttail shrew <u>Blarina brevicauda</u>	X			1, 2, 5c
Eastern mole <u>Scalopus aquaticus</u>	X			1, 2, 5abcd
Little brown myotis <u>Myotis lucifugus</u>		X		1, 2, 5d, caves
Mississippi myotis <u>M. austroriparius</u>			X	1, 2, caves
Gray myotis <u>M. grisescens</u>			X	caves
Keen myotis <u>M. keeni</u>		X		1, 2, caves
Indiana myotis <u>M. sodalis</u>		X		1, 2, caves
Silver-haired bat <u>Lasionycteris noctivagans</u>		X		1, 2, 5d, caves
Eastern pipistrel <u>Pipistrellus subflavus</u>		X		5d, caves
Big brown bat <u>Eptesicus fuscus</u>		X		1, 2, 5d, caves
Red bat <u>Lasiurus borealis</u>	X			1, 2
Hoary bat <u>L. cinereus</u>		X		1, 2
Evening bat <u>Nycticeius humeralis</u>		X		1, 2, 5d
Eastern big-eared bat <u>Plecotus rafinesquei</u>		X		5d, caves
Raccoon <u>Procyon lotor</u>	X			1, 2
Longtail weasel <u>Mustela frenata</u>		X		1, 2, 5c
Mink <u>M. vison</u>	X			2, 3, 4ab, 5e
River otter <u>Lutra canadensis</u>			X	2, 3, 4ab
Spotted skunk <u>Spilogale putorius</u>		X		5abc
Striped skunk <u>Mephitis mephitis</u>	X			1, 2, 5abc
Coyote <u>Canis latrans</u>	X			1, 2, 5abc
Red fox <u>Vulpes fulva</u>	X			1, 2, 5abc

Appendix F. Continued.

Species	Known	Potential		Preferred Habitat(s)
		Expected	Not Expected	
Gray fox <u>Urocyon cinereoargenteus</u>	X			1, 2, 5c
Bobcat <u>Lynx rufus</u>		X		1, 2
Woodchuck <u>Marmota monax</u>	X			1, 2, 5abcd
Eastern chipmunk <u>Tamias striatus</u>	X			1, 2
Eastern gray squirrel <u>Sciurus carolinensis</u>	X			1, 2
Eastern fox squirrel <u>S. niger</u>	X			1, 2
Southern flying squirrel <u>Glaucomys volans</u>	X			1, 2
Beaver <u>Castor canadensis</u>	X			2, 3, 4ab
Deer mouse <u>Peromyscus maniculatus</u>		X		5abc
White-footed mouse <u>P. leucopus</u>	X			1, 2, 5ac
Cotton mouse <u>P. gossypinus</u>		X		2, 3
Golden mouse <u>P. nuttalli</u>	X			1, 2
Eastern woodrat <u>Neotoma floridana</u>			X	1, limestone bluffs
Rice rat <u>Oryzomys palustris</u>		X		2, 3, 4a, marshes
Southern bog lemming <u>Synaptomys cooperi</u>			X	2, 3, bogs, wet meadows
Prairie vole <u>Microtus ochrogaster</u>	X			5abc
Pine vole <u>Pitymys pinetorum</u>		X		1, 2, 5c
Muskrat <u>Ondatra zibethicus</u>	X			3, 4a, 5e
Norway rat <u>Rattus norvegicus</u>		X		5acd
House mouse <u>Mus musculus</u>		X		1, 2, 5d
Meadow jumping mouse <u>Zapus hudsonius</u>		X		2, 3, 5abc
Eastern cottontail <u>Sylvilagus floridanus</u>	X			1, 2, 5acd
Swamp rabbit <u>S. aquaticus</u>		X		2
White-tailed deer <u>Odocoileus virginianus</u>	X			1, 2, 5abc

Appendix G

FISH SPECIES KNOWN OR POTENTIAL IN THE ILLINOIS
ROUTE 3 STUDY AREA

Sources: C.K. Trout, Southern Illinois University. Personal
observation and collection records. 1984.

Ichthyological collections at:

Illinois Natural History Survey, Section of Faunistic
Surveys and Insect Identification, Champaign.

Department of Zoology, Southern Illinois University,
Carbondale.

Taxonomic keys: Pflieger 1975

Smith 1979

Trautman 1981

Note: List contains scientific names of species mentioned by
common name in the text. Nomenclature follows Robin et
al. (1980). Known species are those collected during
this study; expected species are those in above collections.

Appendix G. Fish species known and potential in the Illinois Route 3 Study Area.

Name	Known	Expected
Petromyzontidae (lampreys)		
Chestnut lamprey		
<u>Ichthyomyzon castaneus</u>	X	
Polyodontidae (paddlefishes)		
Paddlefish		
<u>Polyodon spathula</u>		X
Lepisosteidae (gars)		
Spotted gar		
<u>Lepisosteus oculatus</u>	X	X
Shortnose gar		
<u>L. platostomus</u>	X	X
Amiidae (bowfins)		
Bowfin		
<u>Amia calva</u>	X	
Clupeidae (herrings)		
Skipjack herring		
<u>Alosa chrysochloris</u>	X	X
Gizzard shad		
<u>Dorosoma cepedianum</u>	X	X
Threadfin shad		
<u>D. petenense</u>		X
Esocidae (pikes)		
Grass pickerel		
<u>Esox americanus vermiculatus</u>	X	X
Cyprinidae (carps and minnows)		
Central stoneroller		
<u>Campeostoma anomalum</u>	X	X
Common carp		
<u>Cyprinus carpio</u>	X	X
Mississippi silvery minnow		
<u>Hybognathus nuchalis</u>		X
Silver chub		
<u>Hybopsis storeriana</u>		X
Golden shiner		
<u>Notemigonus crysoleucas</u>	X	X
Emerald shiner		
<u>Notropis atherinoides</u>	X	X
River shiner		
<u>N. blennius</u>		X
Bigeye shiner		
<u>N. boops</u>	X	X
Ghost shiner		
<u>N. buchananii</u>		X
Red shiner		
<u>N. lutrensis</u>	X	X
Silverband shiner		
<u>N. shumardi</u>		X
Redfin shiner		
<u>N. umbratilis</u>	X	X
Blacktail shiner		
<u>N. venustus</u>	X	X
Mimic shiner		
<u>N. volucellus</u>		X
Suckermouth minnow		
<u>Phenacobius mirabilis</u>		X
Bluntnose minnow		
<u>Pimephales notatus</u>	X	X
Bullhead minnow		
<u>P. vigilax</u>		X
Creek chub		
<u>Semotilus atromaculatus</u>	X	X
Catostomidae (suckers)		
River carpsucker		
<u>Carpiodes carpio</u>	X	
Highfin carpsucker		
<u>C. velifer</u>		X
White sucker		
<u>Catostomus commersoni</u>		X

Appendix G. Continued.

Name	Known	Expected
Creek chubsucker		
<u>Erimyzon oblongus</u>	X	X
Smallmouth buffalo		
<u>Ictiobus bubalus</u>	X	X
Bigmouth buffalo		
<u>I. cyprenellus</u>	X	
Ictaluridae (bullhead catfishes)		
Black bullhead		
<u>Ictalurus melas</u>	X	
Yellow bullhead		
<u>I. natalis</u>	X	
Channel catfish		
<u>I. punctatus</u>	X	X
Tadpole madtom		
<u>Noturus gyrinus</u>		X
Flathead catfish		
<u>Pylodictis olivaris</u>	X	
Aphredoderidae (pirate perches)		
Pirate perch		
<u>Aphredoderus sayanus</u>	X	X
Cyprinodontidae (killifishes)		
Blackstripe topminnow		
<u>Fundulus notatus</u>	X	X
Blackspotted topminnow		
<u>F. olivaceus</u>	X	X
Poeciliidae (livebearers)		
Mosquitofish		
<u>Labidesthes sicculus</u>	X	X
Percichthyidae (temperate basses)		
White bass		
<u>Morone chrysops</u>	X	X
Centrarchidae (sunfishes)		
Green sunfish		
<u>Lepomis cyanellus</u>	X	X
Warmouth		
<u>L. gulosus</u>	X	X
Orangespotted sunfish		
<u>L. humilis</u>	X	X
Bluegill		
<u>L. macrochirus</u>	X	X
Longear sunfish		
<u>L. megalotis</u>	X	X
Redear sunfish		
<u>L. microlophus</u>	X	
Spotted bass		
<u>Micropterus punctulatus</u>	X	X
Largemouth bass		
<u>M. salmoides</u>	X	X
White crappie		
<u>Pomoxis annularis</u>	X	X
Black crappie		
<u>P. nigromaculatus</u>	X	X
Percidae (darters)		
Mud darter		
<u>Etheostoma asprigene</u>	X	X
Bluntnose darter		
<u>E. chlorosomum</u>	X	X
Slough darter		
<u>E. gracile</u>	X	X
Johnny darter		
<u>E. nigrum</u>	X	
Logperch		
<u>Percina caprodes</u>	X	X
River darter		
<u>P. shumardi</u>		X
Sauger		
<u>Stizostedion canadense</u>	X	X
Sciaenidae (drums)		
Freshwater drum		
<u>Aplodinotus grunniens</u>	X	X

Appendix H. Fish species collected in Sexton Creek, 1959-1984.

Species	1959*	1963*	1964*	1965*	1984
Chestnut lamprey	-	-	-	-	X
Paddle fish	-	-	-	X	-
Spotted gar	-	-	-	-	X
Shortnose gar	-	-	X	X	X
Skipjack herring	-	-	-	X	-
Gizzard shad	X	X	X	-	X
Threadfin shad	-	-	X	-	-
Central stoneroller	X	X	X	-	-
Carp	-	-	-	X	X
Mississippi silvery minnow	X	-	-	X	-
Silver chub	-	-	-	X	-
Golden shiner	X	-	-	X	-
Emerald shiner	X	X	X	-	-
River shiner	-	-	X	-	-
Bigeye shiner	-	-	X	-	-
Ghost shiner	-	-	X	-	-
Red shiner	X	X	X	-	-
Silverband shiner	-	-	-	X	-
Redfin shiner	X	-	X	-	-
Blacktail shiner	-	X	X	-	-
Mimic shiner	-	X	-	-	-
Suckermouth minnow	X	-	-	-	-
Bluntnose minnow	X	X	X	-	-
Bullhead minnow	-	X	X	-	-
Creek chub	X	-	X	-	-
Highfin carpsucker	-	-	-	X	-
Creek chubsucker	X	-	X	-	-
Smallmouth buffalo	-	-	-	X	X
Bigmouth buffalo	-	-	-	-	X
Channel catfish	-	X	-	-	X
Flathead catfish	-	-	-	-	X
Tadpole madtom	-	-	X	-	-
Blackstripe topminnow	X	X	X	-	-
Blackspotted topminnow	X	-	X	-	-
Mosquitofish	X	X	X	-	-
Brook silverside	-	-	X	-	X
White bass	-	-	-	X	X
Green sunfish	X	X	X	-	-
Warmouth	-	-	X	-	-
Orangespotted sunfish	X	X	X	-	-
Bluegill	X	X	X	-	X
Longear sunfish	X	X	X	-	-
Spotted bass	X	X	X	-	-
Largemouth bass	-	-	X	-	X
White crappie	-	-	X	-	X
Black crappie	-	-	-	X	-
Mud darter	X	X	X	-	-
Bluntnose darter	-	-	X	-	-
Slough darter	-	-	X	-	-
Orangethroat darter	X	X	X	-	-
Log perch	X	X	-	-	-
River darter	-	X	X	X	-
Sauger	-	-	X	-	X
Freshwater drum	-	X	-	-	X
Species collected	22	21	34	13	16

* Illinois Natural History Survey, unpubl. data.

Appendix I. Fish species collected in Miller Creek, 1964-1984.

Species	1964 ^a	1982 ^b	1984
Spotted gar	X	-	-
Bowfin	-	-	X
Skipjack herring	-	-	X
Gizzard shad	X	-	X
Grass pickerel	-	X	X
Central stoneroller	X	X	X
Common carp	-	-	X
Golden shiner	X	-	X
Emerald shiner	X	X	X
Bigeye shiner	X	X	X
Ghost shiner	X	-	-
Red shiner	X	X	X
Redfin shiner	X	X	X
Blacktail shiner	-	-	X
Bluntnose minnow	X	X	X
Bullhead minnow	X	-	-
Creek chub	X	-	X
River carpsucker	-	-	X
White sucker	X	-	-
Creek chubsucker	X	-	X
Smallmouth buffalo	-	-	X
Bigmouth buffalo	-	-	X
Black bullhead	-	-	X
Yellow bullhead	-	-	X
Channel catfish	X	-	-
Pirate perch	X	-	X
Blackstripe topminnow	X	-	X
Blackspotted topminnow	X	X	X
Mosquito fish	X	-	-
White bass	-	-	X
Green sunfish	X	-	X
Warmouth	X	-	-
Orangespotted sunfish	X	-	X
Bluegill	X	X	X
Longear sunfish	X	X	X
Redear sunfish	-	-	X
Spotted bass	-	-	X
Largemouth bass	X	-	X
White crappie	X	-	X
Black crappie	X	-	X
Mud darter	X	-	X
Bluntnose darter	X	-	X
Slough darter	-	-	X
Orangethroat darter	X	X	X
Log perch	X	X	X
River darter	X	-	-
Freshwater drum	X	-	X
Species Represented	33	12	39

^a Illinois Natural History Survey, unpubl. data.^b Southern Illinois University, Dept. of Zoology, unpubl. data.

Appendix J.

MUSSELS KNOWN OR POTENTIAL IN THE ILLINOIS
ROUTE 3 STUDY AREA

Sources: C.K. Trout, Southern Illinois University. Personal observation and collection records. 1984.

Baker 1906	Pennak 1978
Baker 1928	Perry 1979
Burch 1973	Rasmussen 1979
Burch 1975	Rasmussen 1980
Clarke 1973	Starret 1971
Fuller 1980	Suloway 1981
Goodrich and van der Schalie 1944	van der Schalie and van der Schalie 1950
Matteson 1955	Uffers 1855
Parmalee 1967	

Taxonomic keys: Burch 1973

Burch 1975

Parmalee 1967

Pennak 1978

Note: List contains scientific names of species mentioned by common name in the text. Nomenclature follows Fuller (1980).

Appendix J. Mussels (Mollusca: Bivalvia: Unionidae) potential in the Illinois Route 3 Study Area.

Name	Known	Potential	
		Expected	Not Expected
Spectable case <u>Margaritifera monodonta</u>			X
Monkeyface <u>Quadrula metanerva</u>			X
Maple leaf <u>Q. quadrula</u>			X
Hartyback <u>Q. nodulata</u>			X
Pimoleback <u>Q. pustulosa</u>		X	
Buckhorn <u>Tritogonia verrucosa</u>			X
Purple pimpleback <u>Cyclonais tuberculata</u>			X
Hashboard <u>Megalanaia gigantea</u>			X
Three ridge <u>Ambiema plicata</u>		X	
Bullhead <u>Plethobasus cyphus</u>			X
Pink pigtoe <u>Pleurobema rubrum</u>			X
Pigtoe <u>Fusconaia flava</u>			X
Ebony shell <u>F. ebena</u>			X
Elephant ear <u>Elliptio crassidens</u>			X
Spike <u>E. dilata</u>			X
Threehorn <u>Obliquaria reflexa</u>			X
Pink heelsplitter <u>Proptera alata</u>		X	
Pink papershell <u>P. laevisima</u>	X	X	
Purple pocketbook <u>P. purpurata</u>			X
Fat pocketbook <u>P. capax</u>			X
Fragile papershell <u>Leptodea fragilis</u>		X	
Narrow papershell <u>L. leptodon</u>			X

Appendix J. Continued

Name	Known	Potential	
		Expected	Not Expected
Butterfly <u>Ellipsaria lineolata</u>			X
Deertoe <u>Truncilla truncata</u>			X
Fawnfoot <u>T. donaciformis</u>			X
Hickory nut <u>Obovaria olivaria</u>			X
Mucket <u>Actinonaias carinata</u>			X
Black sandshell <u>Liguma recta</u>			X
Western pond mussel <u>L. subrostrata</u>	X	X	
Lilliput <u>Carunculina parva</u>		X	
Yellow sandshell <u>Lampsilis teres</u>			X
Fat mucket <u>L. radiata siliquoidea</u>		X	
Higgin's eye <u>L. higginsii</u>			X
Pocketbook <u>L. ovata ventricosa</u>			X
Snuffbox <u>Plagiola triguetra</u>			X
Rockshell <u>Arcidens confragosus</u>		X	
White heelsplitter <u>Lasmigona complanata</u>		X	
Fluted shell <u>L. costata</u>			X
Creek heelsplitter <u>L. compressa</u>			X
Flat floater <u>Anodonta suborbiculata</u>		X	
Paper floater <u>A. imbicillis</u>	X	X	
Giant floater <u>A. grandis</u>	X	X	
Strange floater <u>Strophitus undulatus</u>		X	

Appendix K.

AQUATIC MACROINVERTEBRATES COLLECTED IN THE ILLINOIS
ROUTE 3 STUDY AREA

Source: C.K. Trout, Southern Illinois University. Personal
observation and collection records. 1984.

Taxonomic keys: Ross 1944

Frison 1935

Burks 1953

Johannsen 1977

Pennak 1978

Merritt and Cummins 1978

Note: Nomenclature standardized to Pennak (1978).

Appendix K. Aquatic macroinvertebrate species occurring in the Illinois Route 3 Study Area.

SEXTON CREEK

Anneiida

Oligochaeta (aquatic earthworm)

Tubificidae

Lumbricidae

Haplotaxidae

Haplotaxus gordiodes

Hirudinea (leech)

Arthropoda

Crustacea

Isopoda (sowbugs)

Asellidae

Lirceus sp.

Decapoda

Palaemonidae (freshwater shrimp)

Palaemonetes sp.

Arachnoidea

Hydrocarina (water mites)

Limnocharidae

Limnochares sp.

Insecta

Plecoptera (stonefly)

Peltoperlidae

Peltoperla sp.

Insecta

Ephemeroptera (mayfly)

Caenidae

Caenis sp.

Ephemeridae

Hexagenia sp.

Tricoptera (caddisfly)

Hydropsychidae

Diptera

Chaoboridae (phantom midge)

Chaoborus sp.

Simuliidae (black fly)

Chironomidae (midge)

Chironomus sp.Pentaneura sp.

Tabanidae (horse fly)

Chrysops sp.

Sciomyzidae (marsh fly)

Anthomyiidae

Limnophora sp.

Mollusca

Pelecypoda (mussel)

Sphaeriidae (finger nail clam)

Sphaerium sp.

MILLER CREEK

Nematoda

Annelida

Oligochaeta (aquatic earthworm)

Naididae

Tubificidae

Branchiura sowerbyi

Hirudinea (leech)

Arthropoda

Crustacea

Isopoda (sowbugs)

Asellidae

Asellus sp.Lirceus sp.

Amphipoda (scud)

Hyalinellidae

Hyalinella azteca

Gammaridae

Gammarus sp.

Decapoda

Cambaridae (crayfish)

Orconectes sp.

Palaemonidae (freshwater shrimp)

Palaemonetes sp.

Arachnoidea

Hydrocarina (water mites)

Limnocharidae

Limnochares sp.

Insecta

Plecoptera (stonefly)

Peltoperla sp.

Perlidae

Isoperla sp.

Ephemeroptera (mayfly)

Baetidae

Baetis sp.

Heptageniidae

Stenacron sp.Stenonema sp.

Caenidae

Caenis sp.

Leptophlebiidae

Chroterpes sp.

Odonata

Zygoptera (damselfly)

Agrionidae

Agrion sp.

Coenagrionidae

Amphiagrion sp.Argia sp.Ischnura sp.

Anisoptera (dragonfly)

Aeshnidae

Boyeria sp.

Corduliidae

Cordulia sp.Dorocordulia sp.

Hemiptera

Corixidae (waterboatman)

Gerridae (water strider)

Gerris sp.Trepobates sp.

Nepidae (water scorpion)

Ranatra sp.

Veliidae (broad-shouldered water strider)

Microvelia sp.Velia sp.Rhagovelia sp.

Tricoptera (caddisfly)

Philopotamidae

Polycentropodidae

Hydropsychidae

Lepidostomatidae

Lepidostoma sp.

Coleoptera (beetle)

Dytiscidae

Copelatus sp.Dytiscus sp.Hydrovatus sp.

Gyrinidae

Dineutus sp.

Hydrophilidae

Berosus sp.Cymbiodyta sp.Helophorus sp.Hydrobius sp.Hydrophilus sp.Troposternus sp.

Elmidae

Stenelmis sp.

Diptera

Tipulidae (crane fly)

Hexatoma sp.

Culicidae (mosquito)

Anopheles sp.Culex sp.

Chaoboridae (phantom midge)

Chaoborus sp.

Psychodidae (moth fly)

Simuliidae (black fly)

Simulium sp.

Appendix K. Continued

MILLER CREEK

Chironomidae (midge)
 Chironomus sp.
 Pentaneura sp.
 Stratiomyidae (soldier fly)
 Stratiomys sp.
 Syrphidae (rattail maggot)

Mollusca
 Gastropoda (snail)
 Physidae
 Physa sp.
 Ancyliidae
 Ferrisia sp.

NORTH POND

Annelida
 Oligochaeta (aquatic earthworm)
 Tubificidae

Arthropoda
 Crustacea
 Decapoda
 Palaemonidae (freshwater shrimp)
 Palaemonetes sp.

Insecta
 Plecoptera (stonefly)
 Peltoperlidae
 Peltoperla sp.
 Ephemeroptera (mayfly)
 Caenidae
 Caenis sp.

Odonata
 Zygoptera (damselfly)
 Coenagrionidae
 Ishnura sp.

Anisoptera (dragonfly)
 Gomphidae
 Gomphus sp.
 Aeshnidae
 Boyeria sp.
 Corduliidae
 Dorocordulia sp.

Hemiptera
 Corixidae (waterboatman)
 Gerridae (water strider)
 Trepobates sp.
 Nepidae (water scorpion)
 Ranatra sp.

Coieoptera (beetle)
 Haliplidae
 Peltodytes sp.
 Dytiscidae
 Hydrovatus sp.

Diptera
 Culicidae (mosquito)
 Anopheles sp.
 Chaoboridae (phantom midge)
 Chaoborus sp.
 Chironomidae (midge)
 Stratiomyidae (soldier fly)
 Odontomyia sp.

Mollusca
 Gastropoda (snail)
 Lymnaeidae
 Lymnaea sp.

SOUTH POND

Annelida
 Oligochaeta (aquatic earthworm)
 Tubificidae

Arthropoda
 Insecta
 Ephemeroptera (mayfly)
 Caenidae
 Caenis sp.

Odonata
 Zygoptera (damselfly)
 Coenagrionidae
 Amphagrion sp.
 Anisoptera (dragonfly)
 Corduliidae
 Dorocordulia sp.
 Libellulidae
 Pantala sp.

Hemiptera
 Corixidae (waterboatman)
 Gerridae (water strider)
 Trepobates sp.
 Nepidae (water scorpion)
 Ranatra sp.

Tricoptera (caddisfly)
 Leptoceridae
 Coleoptera (beetle)
 Dytiscidae
 Hydrovatus sp.
 Hydrophilidae
 Hydrobius sp.

Diptera
 Culicidae (mosquito)
 Culex sp.
 Chaoboridae (phantom midge)
 Chaoborus sp.
 Chironomidae (midge)

Mollusca
 Gastropoda (snail)
 Planorbidae
 Gyraulus sp.
 Physidae
 Physa sp.



